



A

TREATISE
UPON THE
DISEASES AND HYGIENE
OF THE ORGANS OF
THE VOICE.

BY

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OF PARIS, FOR THE TREATMENT OF ALL VICES OF
SPEECH, DISEASES OF THE VOICE, ETC.

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SECOND EDITION:

14302

BOSTON:

REDDING & COMPANY, 8 STATE STREET.

1857.

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1857

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DESCRIPTION OF THE FRONTISPICE.

In this plate a vertical section is supposed to have been made in the neck, immediately in front of the spinal column, and between it and the organs of the voice. The observer looks from behind forwards. The five first figures refer to bony portions of the skull.

- 1, the occipital process.
- 2, 2, portions of the temporal bones.
- 3, 3, great wings of the sphenoid bone.
- 4, 4, condyles of the lower jaw.
- 5, 5, branches of the lower jaw.
- 6, 6, 6, divided edges of the pharynx drawn outwards.
- 7, 7, the posterior nasal openings, corresponding to the nasal fossæ, or sinuses.
- 8, the separation of the two fossæ covered by mucous membrane.
- 9, 9, the openings of the Eustachian tube.
- 10, the soft palate.
- 11, 11, an elevation marking the site of the levator palate muscle.
- 12, the uvula.
- 13, 13, posterior opening of the fauces, or the isthmus.
- 14, 14, the tonsils.
- 15, root of the tongue.
- 16, epiglottis.
- 17, the opening into the larynx.
- 18, 18, aryteno-epiglottidean folds of mucous membrane.
- 19, convexity of the larynx.
- 20, 20, two slight projections corresponding to the ascending horns of the thyroid cartilage.
- 21, the opening into the œsophagus.
- 22, the trachea divided transversely.



TABLE OF CONTENTS.

TRANSLATOR'S PREFACE,.....	ix
DESCRIPTION OF FRONTISPICE,.....	xiii
DESCRIPTION OF THE VOCAL INSTRUMENT,.....	1-11
Vocal organs, 1; larynx, 2; vocal cords, 7; muscles, 10.	
THE VOICE AND ITS FORMATION,.....	12-26
Difference of the voice as regards age, sex, etc., 13; what animals are capable of producing a vocal sound, 14; fishes and insects have no voice, 14; modification of the voice by circumstances, 15; the voice weaker after a meal, 15; this organ cannot be imitated by art, 16; the famous statue of Memnon, 16; singing is a modification of the voice, 17; singing natural to man, 17; opinions of Rousseau and Blumenbach, 18; case of a deaf mute, 18; influence of the passions upon the voice, 19; the difference of the vocal timbre depending upon the moral qualities and inclinations of the individual, 19; sympathies of the voice, 20; inflexions of the voice with regard to climate and nation, 21; extent and system of the voice in music, 23; difference between the articulated and modulated voice, 24.	
MECHANISM OF THE VOICE,.....	26-51
Expiration of the air necessary to the voice, 28; different theories of the vocal mechanism, 29; opinions of Aristotle, Galen, Fabricius, Casserius, Dodart, Ferrein, Bichat, Richerand,	
A*	

Cuvier, Dutrochet, Magendie, Biot, Savard, Despinay, 29 ; former opinion of the author, 35 ; criticism upon all ancient and modern opinions, 37 ; case of a vocal anomaly in a singer of the Italian theatre, 42 ; opinion of the author upon the mechanism of the spoken voice, and of singing in the grave notes, 46.

THE PHARYNGEAN VOICE, OR FAUCETTE,.....52-90

The glottis is not the only organ productive of sounds, 52 ; mechanism of the sounds of the faucette, 53 ; organs which participate in it, 54 ; experiment of M. Deleau, 56 ; etymology of the word *faucette*, 58 ; theory of M. Bennati, 60 ; peculiar conformation of the vocal organs in base and soprani singers, 63 ; particular diseases of each class of singers, 64 ; why the exercise of singing is more fatiguing than that of speaking, 65 ; physiological disorders resulting from singing, 66 ; the most natural object of singing, 68 ; hygienic advantages to be derived from this exercise, 69 ; its effects upon the nervous system and nervous diseases, 70 ; its protective powers in epidemic diseases, 70 ; singers and musicians are less exposed to epidemics, 70 ; honors paid to singing among the ancients, particularly the Greeks, 71 ; singing pleasant to all men, 71 ; united with music it constitutes the chief ornament of our large assemblies and our theatres, 71 ; it elevates the soul of man to God, 71 ; it inspires great actions and virtue, 71 ; it excites courage and all the passions, 71 ; change of the voice at the period of puberty, 72 ; precautions to be taken at this period, 72 ; dangers of continuing the exercise of singing when certain conditions are not complied with, 72 ; what class of persons ought not to sing, 75 ; vocal illusions, 77 ; ventriloquy, 77 ; various opinions about ventriloquy, 78 ; definition of the cry, 83 ; its mechanism, 85 ; its variations in every pain, 86 ; analysis of cries, and their intonation in the pain from the application of fire, 86 ; of a cutting instrument, 86 ; of an acute affection not caused by an external agent, 87 ; groaning, 87 ; sudden fright, 87 ; pains of labor, 87 ; sighs or tears, 88 ; organs formed by the cries of animals, 88 ; anecdote related by Cahusac, 88 ; difficulty of explaining all the vocal inflexions, etc., 89.

TABLE OF CONTENTS.

vii

APHONY AND DYSPHONY,	91-111
Definition and difference of these two vocal alterations, 91 ; synoptical table of the organic lesions and diseases which may cause aphony and dysphony, 95 ; <i>chronic enlargement</i> <i>of the tonsils</i> , 98 ; <i>organic prolongation of the uvula, and</i> <i>prolapsus of this organ</i> , 105 ; its sensibility, 106 ; its infiltration, 107 ; causes of this affection, 107 ; it may cause laryn- geal phthisis, 109.	
CHRONIC INFLAMMATIONS OF THE LARYNX AND TRACHEA, AND OF PRIMITIVE LARYNGEAL PHTHISIS,.....	112-129
A cold or slight bronchitis, its causes and treatment, 112 ; of acute and intense bronchitis, its causes and treatment, 114 ; chronic bronchitis, and its treatment, 117 ; who are most exposed to catarrhal affections, 118 ; chronic laryn- gitis and its medico-chirurgical treatment, 126.	
SYMPATHETIC APHONY AND DYSPHONY,.....	130-135
What is understood by sympathies and sympathetic aphony, 130 ; various facts proving the sympathy of the sexual organs with those of the voice, 131 ; treatment of the vocal alterations of this class, 133.	
SPECIFIC APHONY AND DYSPHONY,.....	136-155
What is understood by specific, 136 ; what are specific affec- tions, 136 ; venereal aphony, 137 ; its symptoms and treat- ment, 138 ; scrofulous aphony, 142 ; difficulty of its diag- nosis, 144 ; its symptoms, 146 ; its treatment, 150 ; exanthe- matous aphony and dysphony, 151 ; their symptoms, 152 ; their treatment, 152 ; chronic scorbutic aphony and dys- phony, 153 ; symptoms, 153 ; treatment, 154.	
APHONY AND DYSPHONY SYMPTOMATIC OF OTHER PARTIC- ULAR AFFECTIONS,.....	156-174
Atonic aphony, 157 ; symptoms, 158 ; treatment, 159 ; compli- cations, 160 ; worm-aphony, 162 ; symptoms, 162 ; treat- ment, 163 ; nervous aphony and dysphony, 163 ; its causes, 163 ; therapeutical measures, 164 ; case at the Hotel-Dieu, 165 ; relative aphony and dysphony, 166.	

HOARSENESS, OR A COLD,.....	168-170
PARTICULAR MODIFICATION OF THE LARYNGO-PHARYNGEAN MUCOUS MEMBRANE,.....	171-174
SORE THROAT AND INFLAMMATIONS OF THE PHARYNX,....	175-190
CORYZA, OR COLD IN THE HEAD,.....	190-194
GARGLES,.....	195-204
HYGIENE OF THE VOICE,.....	205-220

TRANSLATOR'S PREFACE.

THE voice has ever been the subject of most careful research and diligent examination to physicians and physiologists, and theories innumerable, based only upon the vain imaginings of their promulgators, have been put forth to the world. Important at all times and seasons, as the means of communication from man to his fellows, the medium by which he expresses the most varied passions, the cheering companion of the family circle, and the mighty power by which multitudes are swayed to the will of one, the culture of the voice has within a short period begun to receive increased and systematic attention. From ignorance of its laws, many a talented speaker has been compelled, after a short period, to relinquish

the eminence he had already attained, and in some new, perhaps less favored path, attempt to exercise the same degree of influence.

Many professions require the most constant and fatiguing exercise of the vocal organs, for which a regular course of training should be gone through. Yet these very professions are entered upon by our young men, without once pausing to reflect, whether they can subject the voice to the arduous duties it may be called upon to perform, or whether the seeds of more fatal disease will not rather be sown, and they themselves numbered with the victims of consumption. Only by gradual efforts does the blacksmith at length gain strength to wield day by day so powerfully the heavy hammer, which our unaccustomed arms will scarce avail to raise from its situation even once. The same is true of all our organs; they must by gradual practice be brought to their full powers. How preposterous, then, it is to dream, that the retirement of the closet, or the severest study can qualify a man in the use of his

voice for the pulpit, the bar, or the stage, immediately upon entering his professional career.

The present translation was undertaken at the request of an eminent Professor of Elocution, with the hope, that it might prove useful to the general reader, by pointing out to him the physiology and diseases of the organs of the voice, the medical treatment of the more common of these affections, and the conditions necessary to preserve them in health. Such points, as related strictly to the surgical details, have been intentionally omitted, in order to render the work as compact as possible, and also because the surgeon, whom these points alone concerns, will find them given at length in the surgical works of the day. In the course of the translation it has even seemed that there were some hints and suggestions, which might not be found altogether useless by the medical profession.

Of the merits of the original work it will be sufficient to say, that to the author, Mons. Colombat de l'Isère, was awarded, by the

Royal Academy of Sciences, the prize of five thousand francs, for his works upon the mechanism of pronunciation, and his success in the treatment of errors of speech, and particularly of stuttering. The favorable and probably unique situation, which he has occupied for many years, as founder and director of the Orthophonic Institution, at Paris, has afforded him such means of observation upon this peculiar class of affections, as have fallen to the lot of no other person. The translator, borrowing the modest language of the author, will only say of his own efforts,—“a subject of this nature requires a more skilful pen than mine, but in undertaking so difficult a task, I have consulted my own powers less than my desire to be useful :

“*Si desint vires, tamen laudanda voluntas.*”

THE VOICE.

CHAPTER I.

DESCRIPTION OF THE VOCAL INSTRUMENT.

ART can never imitate the mechanism and sounds of the vocal instrument, and man will in vain seek to communicate to mechanical instruments the principles of the animal organization, because he will never have at his disposal the elements of vital action.

The organs, which by their union contribute to form and modify the vocal sounds, are the following: 1. The lungs, the reservoirs of the air; 2. The muscles of respiration and the chest, which act like the bellows; 3. The trachea and bronchi, constituting a windpipe bifurcated inferiorly; 4. The larynx proper, which acts as an elastic and movable mouthpiece; 5. The glottis,

the vocal cords of which are well represented by the lips of a musician playing upon the horn; 6. Finally, the pharynx or back part of the mouth, the veil of the palate, the uvula, the tonsils, the epiglottis, the palatine arch, the nasal cavities, the maxillary sinuses, the lips, the cheeks, etc., equally contribute to the formation of the voice, and play an important part in the intensity and modulation of the sounds.

To render this work complete, a detailed description of all the parts mentioned ought, perhaps, to be given; but as I have nothing new to add with regard to their anatomy, and as such details would enlarge too much a work intended for the general reader, a few words with regard to the form and structure of the larynx are all that seem necessary to me.

The larynx, from the Greek $\lambda\alpha\gamma\nu\gamma\xi$, *a whistle*, the principal organ of the voice, is a kind of cartilaginous box, which, taken as a whole, has the general form of a hollow and reversed cone, with its base turned upwards towards the tongue in the shape of an expanded triangle opening into the pharynx, and its summit, united inferiorly to the trachea, is continuous with that canal by a rounded opening.

The superior orifice of the larynx is an oval

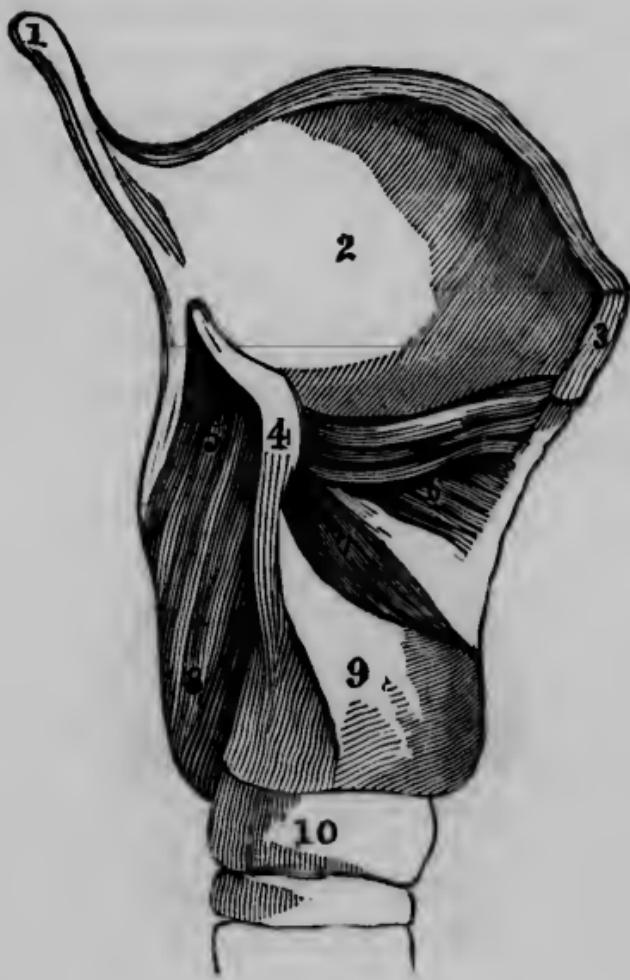


Fig. 1.*

space, bounded in front by the epiglottis, behind

* The right wing of the thyroid cartilage has been cut away in this plate, in order to expose the muscles connected with the edge of the glottis. No. 1. The large horn of the thyroid cartilage. 2. The interior surface of its left wing. 3. The surface of the incision made to remove the right wing. 4. The right arytenoid cartilage. 5. Part of the arytenoid muscle. 6. The thyro-arytenoid muscle. 7. The lateral crico-arytenoid muscle. 8. The posterior crico-arytenoid muscle. 9. The right side of the cricoid cartilage. 10. The first ring of the trachea.

by the arytenoid cartilages, and upon the sides by the folds of the mucous membrane. This superior orifice of the larynx is always open, and passive as regards the formation of the voice and respiration.*

The walls of the larynx are chiefly formed by the union of several cartilages, called the *thyroid*, *arytenoid*, *cricoid*, and the *epiglottis*, which is a *fibro-cartilage*.



Fig. 2.

The *thyroid* or *scutiform* cartilage, from the Greek *θυρεος*, a *buckler*, and *ευδος*, *form*, is the largest of all the cartilages of the larynx. It

*Those who have never seen, or who have badly studied the larynx, always confound the superior opening of this organ with the glottis, which is below. The name of *epiglottis* contributes to perpetuate this error, because the inference is that the *epiglottis* immediately covers the glottis.

forms the anterior wall of this organ, and the projection in the neck, which is called *Adam's apple*, marked 1 in the figure; 2 indicates the square sides of this cartilage; 3 its upper, and 4 the smaller, horns.



Fig. 3.

The two *arytenoid* cartilages (2,) from the Greek *αρυταινα*, *a ladle*, and *ειδος*, *form*, united by their anterior edges to the posterior borders of the preceding are situated at the posterior and superior part of the organ.

The *cricoid* cartilage, (1, Fig. 3,) from the Greek *κρικος*, *a ring*, and *ειδος*, *form*, circular, as its name indicates, is situated at the inferior part of the larynx, and united by its superior borders, through the intervention of a membrane, to the inferior borders of the three cartilages just mentioned; below, it corresponds to the first ring of the trachea of which it is a continuation.

There now remain four cartilages, which are the two *corniculated* cartilages, called, also, the tubercles of *Santorini*, and the *cuneiform* or cartilages of *Meckel*; but as these cartilages have been less studied, and as their functions are but little known, the mention of them will be sufficient.

Finally, the *epiglottis*,* a vigilant sentinel, is placed at the superior part of the larynx, and fixed to the upper border of the thyroid cartilage, behind the base of the tongue. It is a fibro-cartilage; its shape has been compared to that of a leaf of parsley; its use is to prevent the introduction of articles of food into the air-passages, and, probably, to modify the sounds as they issue from the glottis.

From what has been said, it will be seen that the *arytenoid* cartilages are by their situation, at the posterior and superior part of the larynx, opposed to the *thyroid*, which forms the anterior and superior part of this organ. The connections maintained by these three cartilages with regard to each other, are of the highest importance in the formation of the vocal sound. In fact, two ligaments, formed of elastic and parallel fibres, enclosed in a fold of the mucous membrane,

* Vide Frontispiece.

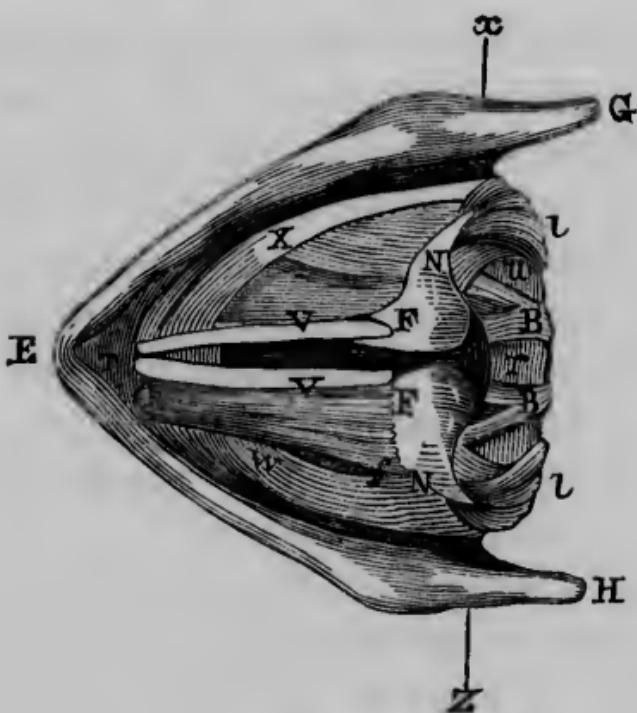


Fig. 4.*

slender and about two lines in width, are inserted behind into an anterior projection at the base of the *arytenoid* cartilages, and passed forwards to be fixed in front to the middle of the angle on the interior of the *thyroid*. These two ligaments, which I call *the lips of the larynx*, were named by *Ferrein* the *vocal cords*, and are called by

* In this plate is represented a view of the larynx from above, G E H the thyroid cartilage, enclosing the ring of the cricoid, r u x w, and turning upon the axis x z, passing through the lower horns, 4, Fig 2; N F, N F, the arytenoid cartilages connected by the transverse arytenoid muscle; T V, T V, the vocal ligaments; N X, the right lateral crico-arytenoid; v k f, the left thyro-arytenoid; N I, N I, the posterior crico-arytenoids; B B, the crico-arytenoid ligaments.

anatomists of the present day *the inferior ligaments of the glottis*, or the *thyro-arytenoidean*. The interval between them forms the glottis, an oblong fissure, from ten to eleven lines in length in the adult male, and from two to three broad in its widest part, varying, however, and more considerable behind than before, where the two vocal cords approximate each other, so as to touch at the point of their insertion into the *thyroid* cartilage.

These ligaments, covered by the fleshy fibres of the *thyro-arytenoid* muscles, to which they adhere, and which they separate from the *lateral crico-arytenoid* muscles, are enveloped by the mucous membrane of the larynx through the remainder of their extent. Their superior face, directed outwardly, constitutes the lower wall of a depression named the *ventricle of the larynx*, the upper wall of which is formed by the superior ligaments of the vocal instrument, which are situated more externally, about the middle of the anterior face of the *arytenoid* cartilage. These ligaments, which are merely a fold of the mucous membrane of the larynx, are not fibrous, are less elastic than the inferior, and represent superiorly another kind of glottis, which is separated from the true glottis by the ventricular cavities just mentioned.

The larynx, as well as the trachea, is lined by a mucous membrane, but it is more sensitive than that of the trachea, and the contact of the smallest foreign body causes in it an excessive irritation, the severity of which strikingly contrasts with the small extent and apparently slight importance of the organ. It is in consequence of these irritations, increased, too, by painful and prolonged movements in the exercise of certain professions, that we often meet with alterations, which, although but slightly visible in the autopsy, have occasioned such mournful results as even to have hastened the hour of death.

The larynx is much more developed and prominent in man than in woman, in whom this organ has but two thirds and even the half of the volume of that of man. In the latter, the retreating angle of the thyroid cartilage is acute, while it is rounded in woman, in whom the central slope of the superior border of the same cartilage is less deep, and the epiglottis less large, less thick, and less prominent than in man.

Less striking differences are to be observed in the fœtus and the infant; only the larynx is not so much developed as it will be at a later period, proportionally in either sex, but especially in ours. It is very remarkable, that this increase is

not progressive, like that of the other organs, but, on the contrary, develops itself almost at once at the period of puberty, and the energy of its functions makes itself apparent at the same time with that of the generative organs. It is this rapid increase, corresponding with the change in the voice, which furnishes us with the most certain signs of puberty. After this period, the larynx experiences no remarkable change, its edges simply become more decidedly developed, its cartilages become hardened and in part ossified in old men, with the exception of the glottis, in which I am not aware that any rudiment of ossification has ever been discovered. In eunuchs this organ is as small as in woman; and the removal of the testicles at an early period, by arresting the development of the larynx, perpetuates in males the clear and feminine voice of adolescence, and even destroys the timbre of that already formed, when the operation has been resorted to soon after the period of puberty.

Finally, to terminate all these dry and lengthy anatomical details, I will add, that several muscles are inserted into the larynx. Some of these muscles are external, and intended to move the entire organ, as to lower or elevate it, to carry it backwards or forwards, or, finally, to hold it steady. The other muscles are internal, and

have for their object to change the relation of its parts, as to enlarge or contract the glottis, to stretch and relax the vocal cords. The external muscles, which attach the larynx to the neighboring parts, are, the *sterno-thyroids*, the *constrictors of the pharynx*, and *all the muscles of the hyoid region*, etc. The internal muscles, which impart all their motions to the cartilaginous pieces composing the organ, are, the *crico-thyroids*, the *posterior crico-arytenoids*, the *lateral crico-arytenoids*, the *thyro-arytenoids*, and the *arytenoid*, properly so called. I will add, also, that the larynx has several glands, the uses of which are but little known ; these glands are, the *epiglottic*, the *arytenoid*, and the *thyroid*. The functions of the latter, especially, are entirely unknown ; those of the others seem to be to secrete a mucus, which lubricates the larynx and the epiglottis, keeps them supple and movable, and prevents them from being irritated by the continual passage of air during respiration, singing, and speaking. Lastly, the nerves of the larynx, which are two on each side, have been named *laryngeal* for the superior, and *recurrent* for the inferior. I shall close by saying that the division of these nerves causes aphony, or loss of the voice, with which we shall be occupied in a future chapter.

CHAPTER II.

THE VOICE AND ITS FORMATION.

THE voice, *φωνή* of the Greek, *vox* of the Latin, is an animal sound, living and articulate, of which the air is the material, the glottis the efficient cause ; finally, the determining cause of the voice is the necessity or state of the mind, to which its actual expression is to be referred.

This faculty of animals, of making themselves heard at considerable distances, is one of the most beautiful attributes of living nature, for without it they would be condemned during life to the silence of death.

Every animal has a voice peculiar to itself, and which is a kind of distinctive character of the species to which it belongs ; these great differences in the voice depend upon a peculiarity in the organization of the parts concerned in its formation.

Vicq d' Azir, in an excellent memorial upon the voice, remarks that the structure of the

larynx is extremely simple in animals with a sonorous and agreeable voice, like the lark and the nightingale ; while the organ is very complicated in those with a strong and disagreeable voice, as hogs, monkeys, etc. It would seem as if nature had been at more trouble to enable the horse to neigh, and the ass to bray, than to render the voice of man capable of imparting to us the most melodious sounds.

The voice presents remarkable differences depending upon the age. It is feeble and shrill in children, but grows strong at a later period ; in woman the vocal timbre changes much less than in man, and it almost always preserves the characteristics of infancy. Young animals have a shriller voice than those which have finished their growth. This is a general rule ; nevertheless, calves are an exception, for it has always been observed, that they have a graver voice than bulls and oxen. The cause of this peculiarity is without doubt in the larynx of these animals, which is larger and more movable when they are young, but gradually contracts as they approach the termination of their youth.

All organized beings, in whom the respiration is effected by the lungs, utter vocal sounds, because they are all provided with a glottis and

larynx.* But these organs present in all classes such multiplied varieties of form and structure, that it is not possible for us to point them out in this place.

The mammiferæ, birds and reptiles, are then the only animals provided with a true vocal instrument, and which can consequently give utterance to a voice properly so called. For it is only necessary for this purpose that a certain quantity of air, accumulated in any receptacle whatever, be driven out with violence, and break against the edges of an orifice more or less narrow and sufficiently contracted. Fishes, which respire by the gills, cannot, for this reason, produce any vocal sound. The monotonous and insipid noises made by some insects, as certain grasshoppers, locusts, and most flies, must not be regarded as a true voice ; the noise produced by them does not come from the mouth, but is the result of the mechanical friction of certain elastic membranes put in rapid agitation. These sonorous organs are sometimes the elytra and wings of the insects, sometimes a kind of membrane in the form of a drum, or, finally, a sort of scraping

* The male duck has scarcely any voice, on account of a dilatation of the trachea, in which the expired air is swallowed up.

produced by the movements of the posterior thighs, in the manner of the violin-bow.

The vocal timbre can be changed and modified by the habits; for instance, those engaged in noisy occupations, such as smiths, millers, etc., or those who inhabit, like sailors, the banks of the sea and great rivers, generally have a stronger voice, from the fact that being obliged in speaking almost always to cover noises often very intense, they exert more strongly their vocal organs.

The voice of man is strong in proportion to the development of the larynx, and the capacity of the chest. For this reason the vocal timbre seems much weaker after a meal, because the stomach, distended by food, diminishes the capacity of the chest by crowding up the diaphragm superiorly.

No sound goes more directly to the soul than the human voice; therefore the instruments more nearly allied to it, such as the concert-horn, the bassoon, and the hautboy, have a more touching and melancholy expression, especially in the minor tones and solemn music. This organ, as admirable for its sweet harmony as for its great simplicity, is, I repeat, beyond all imitation, and not even the most skilful mechanic will ever

devise an instrument to produce sounds as beautiful, and furnish in the same degree of perfection this melodious timbre, these varied tones, and these inflexions so manifold and agreeable.

The experiments of *Ferrein*, by means of which, as he himself said, *he made the dead speak*, are well known. The Dominican, *Albert the Great*, constructed a head, which, by peculiar mechanism, was enabled to pronounce some articulate sounds. The famous statue of *Memnon*, which sung, upon the authority of *Pliny* and of *Strabo*, is not less wonderful, although it uttered only inarticulate sounds. The history of this prodigy may furnish an idea of the others, and show how far art has always been from nature. “The Egyptians, to perpetuate the memory of *Memnon*, had erected in his honor, in the temple of the god *Apis*, upon the borders of the river Belus, a statue which had this peculiarity, that being lighted and struck by the rays of the rising sun, it sent forth a sound as melodious as that of a lyre, while in the evening the sound was mournful and deep, which might have been a very natural effect of the dilatation and condensation of the air. A reed had undoubtedly been adapted to the mouth of the statue ; in the morning the air, warmed by the rays of the sun, issued

with a clear sound ; in the evening, when the sun retired, and the statue grew cold, the returning air caused a dull sound in its interior. In a word, the effect being external in the morning, and internal in the evening, the variation in the sounds is naturally explained.” *

Singing is a modification of the voice depending upon the passions, and especially that of love ; this is the reason, perhaps, why at that interesting period of life, when we experience for the first time this thirst for love, nature develops in so rapid a manner the vocal organs, and changes almost at once the timbre of the voice. In the season of spring, when the birds are accustomed to choose their mates, the singing of the nightingale is in all its beauty, while in the month of June, when it has young, its voice is so disagreeable and so much changed, that it is contemptible.

Of all the actions peculiar to man, singing is the most familiar to him ; there are no people, even the least civilized, among whom singing is not practised. The savages of America, the Caffres, the Esquimaux, and the Greenlanders, experience, as well as the Europeans, the desire for singing. Rousseau is therefore in the wrong

* Rouland.

when he says that singing is not natural to man ; and so, too, is that German author, *Blumenbach*, who has advanced the doctrine, that if whistling is peculiar to birds, singing belongs to man alone. These two opinions, which are paradoxes, are founded upon a puerile verbal distinction ; for singing does not require the application of words, these being but an explanation, of which the melody is the picture. It is, moreover, a common fact that certain mutes, without uttering any articulated notes, can sing and modulate sounds almost as agreeably as those who speak.*

To a delicate ear, the voice of the individual may teach many things with regard to his temperament, character, moral qualities and states of mind. It is certain, that the condition of the mind exerts a marked influence over the organ of the voice, which always varies according to circumstances. We may therefore say with *Gretry*, that if man can conceal himself in his

* I have now under my care a young man, thirteen years of age, to whom, a year since, I restored the power of speech. When, I had succeeded in teaching him to listen and to hear, although he could not then articulate a single word, he repeated accurately and in time, all the airs that I sang or played to him upon the horn or violin. I have also seen an old soldier, whose tongue had been completely removed by a bullet, who sung in an extremely agreeable manner, and modulated with much taste and talent the most difficult airs of the French and Italian operas.

conversation, he has not yet learned to disguise his intonations. The immortal physiognomist of Switzerland, *Lavater*, said, that the voice and the countenance were very often associated.

In a work of Father *Kircher*, we read, that a strong and hoarse voice is that of a man avaricious, pusillanimous, insolent in prosperity, cowardly in misfortune ; such was *Caligula*, according to *Tacitus*. The voice which is grave at first, and terminates in *faucette*,* is that of a sad and irritable scold ; the sharp, feeble, and broken voice is that of an effeminate ; that which is sharp and strong indicates a man devoted to pleasure ; finally, the same author adds, that the grave, sonorous, heavy and precipitated voice denotes an individual enterprising, bold, and adapted to the execution of great things.

If the voice, in an ordinary condition of the mind, can discover to us the inclinations and moral qualities of the man, it will yet far more certainly expose the different passions with which he is agitated. Fear and languor lower the voice, astonishment cuts its off, admiration prolongs it, hope renders it sonorous and equal, anger makes it hoarse and interrupted, desire

* The reason will hereafter be given why this word should be written *faucette*, and not *falsette*.

hastens the words and causes the phrases to begin by long exclamations. Boldness renders the discourse laconical ; it always leaves something for thought to supply : *quos ego !!!*... *Plato* knew so well that the sound of the voice could, to a certain point, discover the moral state of men, that when he wished to know those who addressed him for the first time, he said to them, *Speak, that I may know you.*

The voice may also often instruct us in regard to the state of the body, on account of its admirable sympathetic relations with the nervous system in general, especially with the sexual parts. To this latter sympathy must be attributed the change of the voice, the fauette of eunuchs, the melodious singing of birds in the season of their loves, and, finally, the aphony (or loss of voice,) upon which we shall make some observations, arising in consequence of a chronic enlargement or acute inflammation of the testicles, and often, also, from a prolapsus of the womb, or a suppression of the menses, and even from child-bearing.

The sympathy of the voice with the whole nervous system is not less manifest ; in fact, in malignant fevers the voice presents a remarkable alteration ; on the accession of acute diseases the patients often complain of pains in the throat,

which, not being the result of any apparent inflammation, generally announce a grave affection, frequently accompanied by nervous accidents. It is the same with all affections complicated with delirium, and with all other nervous diseases, such as insanity, the cholera, etc., which are ranked in this class by most physicians. Finally, the inconvenient spasm experienced in the throat by hysterical females and hypochondriacal subjects, is a new proof in favor of this sympathy.

In the warm seasons the voice is more beautiful and more sharp; in winter, on the contrary, it is more grave and hoarse. It is probably owing to the influence of the temperature, that the people of the south have in general a finer and more sonorous voice than the inhabitants of the cold countries. Foreigners acknowledge, that in France are found the greatest number of fine voices; how far is this to be ascribed to the development of the chest, which in that country has in general a better conformation? *

The idioms of the south, such as the Spanish

* Nature, according to the Abbe Expili, develops more fully certain parts of the body in one climate than in another. He considers, that a man would be perfect in his physical development, who had the legs of a Spaniard, the hand of a German, the head of an Englishman, the eyes of an Italian, the body, size, and gait of a Frenchman.

and Italian languages, the accents of which are more marked by the vocal inflexions and the frequent use of the vowels, are more favorable to music than the languages of the north, the pronunciation of which is very far from singing. In a language as harmonious as was anciently the Greek, there must have been without doubt very little difference between the *speaking* and the *singing* voice.

If the same musical phrase were to be sung in words translated into the principal languages of Europe, the difference to the ear in harmony and sweetness would be very striking. The Italian and the Dutch languages, taken as the two extremes of the comparison, would follow a progressive course, in the following order : *Italian, modern Greek, Portuguese, Spanish, French, German, English, Dutch.*

The people of the south greatly prefer the shrill voices ; those of temperate countries prefer the median ; finally, the inhabitants of the northern regions seem to give the preference to the base. The difference of climate probably exerts an influence over the taste of nations, as well as over the sweetness of the tongues. In Italy, the first male parts in the operas are filled by *sopranis* ; in France, by *tenors* ; in Germany, by *base*.

The human voice is the most beautiful medium of execution possessed by the musical art. It will ever be in vain, therefore, for instruments to attempt to imitate it ; for, like slaves which precede or follow their master, they have only been invented to accompany and sustain the voice.

As each individual is distinguished from another by his physical features and form, so may he easily be by the nature and timbre of his voice. But there are some of these differences common to several persons, and which form so many different kinds of voice, each of which has received a particular denomination.

To carry the vocal system to the capacity of that of the great singers, which is often in three octaves, it has been agreed to divide it into six parts, which represent six kinds of voice :

- 1st. The first above, *first soprano*.
- 2d. The second above, *second soprano*.
- 3d. The *contralto*.
- 4th. The *tenor*.
- 5th. The *baritone*.
- 6th. The *base*.

It is not then from the timbre and volume of the voices, but rather from their extent in the musical scale, that this general distinctive character has been devised.

The grave voice is not usually met with in man till after puberty ; while acute voices are more frequently met with in women, children, eunuchs, and in most men who take the faucette in singing.

Voices are also known by other differences than those of the grave and acute. There are strong voices, in which the sounds are strong and brilliant ; sweet voices, in which the sounds resemble the tones of the flute ; extensive voices, those which run through a large musical scale ; beautiful voices, the timbre of which is full, just and harmonious. There is also the contrary of all this ; for example, we meet with harsh, hoarse, unequal voices, those in which the beautiful sounds are unequally distributed, whether in the first, the second, or the third octave. An even voice, on the contrary, is one, in which the timbre is always the same through its whole extent ; finally, the voices, which pass without a harsh transition from the grave to the acute, are designated by the epithets of flexible and easily managed,—with unvarying sweetness and flexibility they run through all the modulations constituting musical and vocal harmony.

It has never been well determined in what the articulated sounds differ from the modulated ;

nevertheless, this difference could be perceived, even if there were wanting to the voice which forms the word merely that permanence of sounds, which constitutes the voice of the true singing. Besides, the true distinctive character of this latter species of voice is, to form harmonic and appreciable sounds, the unison of which may not only be taken and felt, but which may even be expressed by signs forming part of our system of music. In the spoken voice, on the other hand, the sounds are not sufficiently sustained to be appreciated, and the different inflexions, which separate them, present only inharmonic and immeasurable intervals.

Physicians and physiologists ought therefore to study the voice of man under different aspects ; they ought to study it, 1st, as a simple sound, such as the cry of infants, comprising in it the various intonations arising from the movements of the mind, the passions, pleasure, pain, disdain, anger, etc., etc. ; 2d, as an articulated sound, such as it is in ordinary conversation ; 3d, as a modulated sound, in singing, which adds to speech the variations in its tones ; 4th, finally, in declamation, which is, at the same time, a modification of the modulated and of the spoken voice, since it may be united to either, or withdrawn from

them. We shall examine the human voice in these four aspects, after having been occupied with its formation and the various opinions which have been promulgated as to its mechanism.

For beings capable of experiencing sensations, it was not sufficient to have organs to transport themselves from place to place, and a volition to seek the things necessary for their life and the well-being of the individual. It was not enough for them to be able to select what pleased, refuse what disgusted, and avoid what menaced or might injure ; it was necessary to render them capable of communicating with their like at considerable distances, and to establish between them relations of a more elevated order. There was wanting a voice, which could express their pain or fear, their hatred or sympathy, their pleasures, loves, joys or desires. Man alone, capable of thought and abstraction, has received from nature the noble privilege of modifying his voice in articulate sounds, which constitute speech.

But this voice,— by what mechanism is it formed ? This we shall seek to explain in the following chapter.

CHAPTER III.

MECHANISM OF THE VOICE, ACCORDING TO THE OPINIONS OF BOTH ANCIENT AND MODERN PHYSICIANS AND PHYSIOLOGISTS.

“The voice is not a simple vibration ; it is animalized ; it is living, like the organs which produce it.”

J. BONNEFOX, *Treatise on Phthisis*, p. 122.

FROM the remotest antiquity the formation of the voice has engaged the attention of physiologists ; but unfortunately for science this question yet leaves much to be desired, and will perhaps always remain undecided on certain points.

Before exposing my own opinions upon the production of the vocal sounds, and the part which, I think, each portion of the vocal apparatus takes in their formation, I must first warn my readers, that although I may have a great number of facts to add, yet I am very far from hoping to derive any personal fame from the treatment of so difficult a subject, after the distinguished men and authors, whom I shall mention.

A great number of theories have been in turn proposed to explain the formation of the voice; before examining them, briefly indeed, I wish the reader to call to mind the way in which the expired air traverses the larynx, when the internal muscles of the glottis are in a state of contraction.

At first, the air, which inspiration has introduced into the lungs, is driven out from their cavities into the larynx by the movement of expiration and the play of the muscles of the chest. This is the first act necessary for the production of the voice, for it is during expiration that the vocal sounds are produced. Several authors think that it takes place during inspiration; I have myself seen stutterers who spoke smoothly sometimes during inspiration, because they articulated more easily in this manner, although the timbre of their voices was very much altered. *Dodart* relates the case of a man, who was tormented by a constant cough, and only spoke during inspiration; *Adrian Tournebœuf* and *Haller* also cite several examples of it; I have myself the power to run through a gamut with sufficient accuracy during a long inspiration, but this gamut only begins at *do* below the first line and finishes at *do* in the octave, in the middle of the scale of five lines. Notwithstanding the facts first cited,

there can be no doubt that the formation of the voice is an expiratory phenomenon; and that when the production of the vocal sounds takes place during inspiration, it is by an unusual mechanism, which acts in the inverse order to that which is natural.

The labors of modern physiologists leave no longer any uncertainty as to the organ which generates the voice, and permit the certain answer, that among the parts which give passage to the expired air the larynx forms the voice; also, that of the several pieces composing the latter, the glottis is the organ essentially phonetic. As there is now no doubt of this, I will not in this place recapitulate the several arguments in favor of this proposition, which is completely beyond refutation.

If this question admits of being readily answered, it is not the same with that which relates to the different mechanisms of the formation of the voice, and to what order of instrument the vocal organ should be referred. Before replying to this question, I will first rapidly examine the different theories already promulgated. Among the principal are the following:

Aristotle and *Galen* compared the larynx to a

flute, and regarded the trachea as the body of the instrument.

In the sixteenth century, the celebrated *Hieronymus Fabricius*, so improperly designated as *Fabricius of Aquapendente*, and his pupil *Casserius of Placentia*, admitted all the opinions of *Galen* and *Aristotle*, but they maintained, with reason, that the trachea was merely a windpipe.

In 1700, *Dodart* compared the organ of the voice to a horn or trumpet; according to him the glottis is the point which answers to the lips of the musician; the body of the instrument extends from the glottis to the external orifice of the vocal canal, the mouth. This theory, well received at the time, and admitted, to borrow the expression of *Haller*, *magno cum plausu*, has for a long time been entirely abandoned.

In 1742, *Ferrein* declared, that the larynx was an instrument with strings, and compared it to a violin. This opinion made much noise at the time, and received an almost general consent, which it was very far from deserving. This observer compared the ligaments of the glottis to the cords of a violin, and gave them the name of *vocal cords*. The current of air was the bow; the thyroid cartilages the fixed points; the arytenoid the pegs; and, finally, the muscles inserted

into them were the powers intended to stretch or relax the cords. Such a theory is very far from being correct, because the cords, to vibrate and produce sounds, must combine certain conditions, such as dryness, fixedness upon a sonorous body, liberty, elasticity, a sufficient tension, a certain length, and finally a certain consistence. None of these conditions being met with in the *pretended vocal cords*, physiologists, and especially modern physicians, have had reason to reject the theory of *Ferrein*, and to cease to regard the larynx as an instrument with strings.

The immortal *Bichat*, that great genius removed at so youthful an age from science, after having made a long series of ingenious experiments, almost all verified and confirmed at a later period by *Magendie*, could not come to any positive deduction, and contented himself with saying, that the harmonic gradation of the vocal sounds would yet be for a long time an object of research, and that a problem so difficult would perhaps never be resolved in an indisputable manner.

Professor *Richerand* maintains the *safe medium* in the opinions already put forth ; for he considers the larynx as, at the same time, both a string and wind instrument.

The modern *Buffon*, the eloquent and profound

naturalist, whom a sudden and unexpected death has just removed from science and from arts—the learned *Cuvier*—ranked the vocal organ in the class of flutes, and regarded the glottis as the reed of the instrument, the mouth as the body, and the nostrils as the lateral holes.

In 1806, M. *Dutrochet* maintained in his inaugural dissertation, that the production of the voice was an active phenomenon depending upon the vibration of the fibres forming the thyro-arytenoid muscles; the vocal pipe is supposed by him to have no influence over the production of tones; the larynx is called a vibrating instrument, but not complicated with a pipe.

Magendie, one of our most illustrious physiologists, who has given to the larynx the name of the *human reed*, thinks with *Biot*, that this organ should be compared to our reed-instruments, such as the hautboy, the bassoon, etc.

Savard, who has published some very remarkable works upon the formation of the voice, has compared the larynx to a kind of whistle, a short instrument pierced at each end by a small orifice, and used by huntsmen to imitate the cry of birds. He has consequently established, that the ligaments of the glottis and the ventricles, which open between them, take an essential part

in the primitive formation of the vocal sounds. The air, traversing the glottis, strikes upon the superior ligaments; the latter bind the superior opening of the instrument, and discharge the same function as the stop of an organ-pipe. Then the air contained in the larynx vibrates and gives out a sound which increases in intensity, because the sonorous waves which form it, are prolonged into the pharynx, the cavity of the mouth, and the nasal fossal. It is evident that the author of this system seeks to account for the uses of the ventricles of the larynx and for that of the superior ligaments, of which no mention is made in the other theories. I do not know how far this theory may correspond with that of nature; although it has appeared to me more rational than any other, I have not been able to admit it completely for several reasons. In the numerous autopsies, that I have made, for the purpose of studying the anatomy of the larynx, I have sometimes found this organ destitute of ventricles and of superior ligaments in individuals, among whom there were several, who in life had a fine vocal timbre. One fact which, I think, goes to prove that the superior ligaments and the ventricles do not play so important a part as that assigned them by M. Savard, is, that if

they are divided in a dog, or merely cauterised to prevent their action, the voice of the animal is not altered, or at any rate is not altered or destroyed, unless the incision or cauterisation be prolonged downwards quite to the inferior ligaments, which form the true glottis.

M. *Despinay*, of Bourg, in his researches upon the voice says, that the sounds, formed in the glottis, undergo in this opening great variations; to pass outward, they escape by the pharynx, a muscular canal, capable of undergoing numerous changes, and also of modifying these sounds; this canal, may be compared, from its influence, to the movable tube of a trombone. In this instrument the sound is formed at the mouthpiece; the different degrees of opening of the lips certainly serve to produce changes in the intonations; they are, in this respect, what the glottis is to the voice; but no one will deny but that the lengthening or shortening of the instrument occasions very different notes. The pharynx acts in the same manner upon the voice; it is elongated by the contraction of the *sterno-thyroid*, *sterno-hyoïds*, *omo-hyoïds*, and is diminished in extent by the influence of the *mylo-hyoid*, *genio-hyoid*, and other muscles. Nevertheless, if the larynx were invariably fixed, it alone would be

capable of giving out the grave tones, as well as the acute and intermediate.

This theory of vocal mechanism, which greatly resembles that which was adopted by me, and pronounced the most rational, when, in 1828, I published my work upon stuttering; this mechanism, I repeat, is no longer considered by me as approximating the closest to nature. But before making known my own opinions in this respect, I wish to endeavor to refute those of M. *Despinay*, and the others which I have mentioned; yet, to proceed with more method, it seems best to give a rapid sketch of the theory which is found in the second edition of my work on **ORTHOPHONY**. This theory is nearly that of M. *Despinay*, as the reader will hereafter perceive. In order to appreciate the analogy, which seems to me to exist between the vocal apparatus and a trombone, I shall say a few words about the latter instrument.

The trombone is an instrument having for its principal pieces a mouthpiece; a tube which is made to vary in length by the musician; finally, an expansion at the inferior opening, in the form of a tunnel more or less considerable in size. To draw sounds from this instrument, air must be driven into its interior by applying the lips upon its mouthpiece, the orifice of which is more

or less diminished, while, at the same time, the tube which constitutes its body, is lengthened or shortened, according as the sounds required are to be grave or acute.

From this description of the trombone, the relation between this instrument and the vocal apparatus will readily be seen. In fact, do not the ventricles of the larynx, which comprise the entire space bounded inferiorly by the vocal cords, and superiorly by the superior ligaments of the glottis, closely resemble the mouthpiece of the instrument? the lips of the glottis, are they not the lips of the musician? the back of the mouth, may it not be regarded as the movable pipe of the trombone, and to be shortened or lengthened, like the latter, so as to depress or increase the sounds? finally, may not the tongue and epiglottis be considered as supplying the place of the hand of a player upon the horn which modulates, softens, or changes the sounds at will? Moreover, the air driven out from the lungs, and carried by the trachea into the larynx, does it not comply with all the conditions required for vibration and the production of sounds, as in all instruments with a reed or mouthpiece? Do we not, also, know from the experiments of the friar Mercène, and from those of Euler, that

of whatever material the pipes of an organ are composed, the sound will always be the same, and equally strong and harmonious, if the internal capacity of these pipes does not vary? This theory seemed to me the most natural, because by it could be explained the elevation and depression of the larynx, corresponding with the enlargement and contraction of the glottis for the emission of the vocal sounds, grave in the first case, and acute in the second. This theory, formerly my own, has been abandoned, because I have convinced myself, and shall show by facts hereafter, that the displacements of the larynx are not indispensable for the formation of sounds, but that their object is merely to facilitate the contractions and relaxations of the glottis. I shall soon endeavor to demonstrate this latter proposition, by combatting the theory which compares the mechanism of the voice to that of the trombone.

Among the ancient and modern authors who have written upon the voice, may be cited the following: Ethmuler, Fernel, Vesale, Wesel, Gunz, Perault, Conrad-Aman, Vic d'Azir, Roger, Haller, Helivalg, Caldani, Spallanzani, J. Frank, Mayer, Leuhossec, Gockel, Lefebure, Portal, Rampont, Geoffroy-Saint-Hilaire, Serres, Biot,

Papillon, Liscowius, Cagniard-de Latour, Grenie, Meckel, Piori, Gerdi, Malgaigne, Deliau, Bourdon, Bennati; finally, a great number of other physiologists, who have put forth opinions so numerous, and often so opposite, that if they were to be collected, it would require several volumes to contain them. As nearly all these opinions may be resolved into three principal, which consist, either in regarding the organ of the voice as a wind instrument with mouth and mouthpiece, as those of the class of flutes or trumpets; or by comparing this organ to a reed instrument; or, finally, to a stringed instrument, or, at the same time, to a wind and stringed instrument, — I deem it my duty to examine all these theories in general and in particular, before expressing my own opinions upon a question of physiology, so much the more difficult, as it never has been, and perhaps never will be settled in an incontestable manner.

The theory which compares the mechanism of the voice to that of reed instruments, where the sound is produced and modified by elastic plates, as in the hautboy, the bassoon, etc.; this theory, which has been well discussed, especially by M. Savart, is not, in my opinion, correct; and the reasons which have prevented me from adopting

it, are the following: In the ordinary instruments, to raise and depress the tones, the reeds are shortened or lengthened in the longitudinal direction; while to produce the same effect in the larynx, the vocal cords are stretched or relaxed in the direction of their width. In musical instruments it never happens, as in the ligaments of the glottis, that the movable plates composing the reeds vary every instant in thickness, length, and elasticity; moreover, these plates are composed of rectilinear fibres fixed at one side only and free at the three others; while the plates or vocal cords of the larynx are fixed on three sides and free at one only, and form by their union a kind of curved sphincter, the fibres of which never present a straight line, except when the lips of the glottis are forcibly applied against each other. They then close the trachea so hermetically, that not a particle of air can escape from the lungs, notwithstanding all the efforts of the respiratory muscles. Finally, it has been impossible for me to admit that fleshy parts, soft, moist, covered by a mucous membrane constantly lubricated by mucosities, adherent in three ways, and filling none of the conditions that a reed should have, could furnish, by the same mechanism as the latter, sounds as strong, as varied, as

harmonious, and as beautiful, as those of the human voice.

From these considerations, I think with the learned physician, M. Savart, that the voice is not produced by the mechanism of reeds, and that this theory is no more worthy to be adopted than that of the cords, proposed by Ferrein, which has already been discussed.

It remains for me to speak of that theory which compares the vocal organ to the instruments of the class of flutes and horns, etc., and those furnished with a movable tube, such as the trombone, or, in other words, those in which the column of air is the vibrating body. This theory, which was that of Fabrieius, of Aquapendente, and of Casserius, and which has been modified by several modern physiologists, among others by Cuvier, Despiney, etc., may be combatted, because the air is regarded as the vibrating body, but only under that of the too great part which, in the other theories, the depression and elevation of the larynx are made to take in the formation of the voice. In fact, those who regard the larynx as a wind instrument, especially those who compare the vocal apparatus to a trombone, as I have for a long time been in the habit of doing, say in support of their opinion,

that in this instrument, and all others in which the air is the vibrating body, the tones become more acute in proportion to the shortening of the tube; in the same way, the elevation of the larynx lengthens the pipe, and the tones are proportionally changed; they also add, that the tones are lowered just as the tube is elongated, and that the larynx descends in the same manner to produce the low tones. Although these movements of the larynx are evident and indubitable, we shall endeavor to show that they are but accessory phenomena in the emission of tones, and that the variations in capacity, of which the pipe is capable, do not determine of themselves the different degrees of elevation of the voice, but are rather intended to correspond to the state of the glottis in the production of sounds more or less grave. Professor Meckel is nearly of this latter opinion, when he says: "With regard to phonation, the larynx ascends in the elevated tones, as much to separate the thyroid cartilage from the cricoid, and, at the same time, stretch its ligaments, as to elongate and fix the trachea. In the low tones, on the contrary, it is depressed to produce the opposite changes."

A fact, which I have very often observed, and which any one can repeat, is, that it is possible,

with a little attention, so to fix the larynx, that, *after having taken the most acute note of the voice, a transition may suddenly be made to the gravest possible note, not by depressing and relaxing the vocal instrument, but, on the contrary, by contracting yet more strongly all the muscles of the vocal apparatus, so as to cause the larynx to ascend yet higher.** By a similar mechanism, which has not yet been observed, or, rather, described, *Ivanoff*, the Russian singer attached to the Italian theatre at Paris, has succeeded in reaching the lowest *sol*. We shall in this place introduce the curious observation with regard to this excellent singer, made by our friend, Dr. Bennati, physician of the Italian theatre, who has published some highly esteemed works upon the present subject. The words of this observation may be found in a treatise presented to the Academy of Sciences by the physician already mentioned ; they are as follows :

“ M. Ivanoff, aged twenty-three years, Russian by birth, tenor-contralto to the Italian theatre, can reach, with a voice of peculiar depth, the lowest *sol* ; that is, an octave below the voices of ordinary

* The sound which results from this mechanism is not pure ; it is a fictitious voice, and has a hoarseness. With a little exercise, any one may create for himself a third scale, as the Russian singer Ivanoff has done.

base singers. The timbre of his voice has, during the emission of this note, a hoarseness, or a fictitious voice which resembles that of ventriloquists, and which I can myself closely imitate during inspiration; but, in my own case, the mechanism of the vocal organs takes place in the usual manner, while in M. Ivanoff the movement of the larynx and of the hyoid bone has an entirely opposite direction.*

“ These are my observations upon him. During the emission of the grave sounds, the larynx is situated anteriorly and superiorly, as takes place in the emission of the ordinary acute sounds, which prevents the position of the superior edges of the thyroid cartilage from being verified; the genio-glossal, hyo-glossal, genio-hyoid muscles, etc., as well as those of the jaws, are greatly contracted.

“ It is to be remarked, that during the emission of the sounds belonging to the natural diapason of the tenor-contralto Ivanoff, the mechanism is the same with that which ordinarily takes place.

* I am astonished that M. Bennati, who has made a special study of the vocal organs, has never remarked, that all those who would exceed the limits of their voices, whether in grave or acute notes, present the same phenomena, the mechanism of which is produced by the great efforts and the contractions made to exceed the ordinary extent of the voice. This fact, presented as an anomaly, is merely a natural thing with every man.

Thus, for example, from *do* grave to *do* acute above the lines, the mechanism of the voice is effected in the natural way ; but when M. Ivanoff would go below the sounds indicated, which it is impossible for him to do for the entire extent of an octave, then the phenomenon in question takes place."

M. Bennati adds, "When we consider that this singer belonged to the chapel of the emperor of Russia, which is composed in general of very remarkable base voices, with regard to the timbre and gravity of their sounds, and several of its members sing to the octave of ordinary base singers, forming a harmony truly admirable, may we not suppose that the imitative efforts, made by M. Ivanoff in the earlier years of his life, have gone far towards the production of the anomaly now described ?" I am entirely of the opinion of M. Bennati in this respect, and I think, as it is always the ear which forms the voice, that, in order to imitate the Russian singers, M. Ivanoff made such great efforts as to oblige him to contract all the muscles of the pharynx, and of the veil of the palate, as if he had wished to give an acute note from the faucette. When the larynx had attained its last point of forced elevation, the vocal cords were relaxed, and the glottis opened

still farther than in the greatest depression of the larynx. This is not a theory; it is a fact that any one may observe upon himself. I do not seek to explain it, but to verify and prove that the movements of the larynx are but movements accessory to the formation of the tones, and intended to facilitate the play of the parts which contribute to stretch or relax the vocal cords. In fact, when the sterno-thyroid muscle contracts to depress the larynx, it opens and dilates by its contraction the thyroid cartilage, which contributes to the production of the grave sounds by the dilatation of the glottis. In the same manner the inferior constrictor of the pharynx, which, with the thyroid muscle, concurs to the elevation of the vocal instrument, contracts the thyroid cartilage, the plates of which it embraces; these plates of the thyroid cartilage approximate the lips of the glottis, by pressing the lateral crico-arytenoid and thyro-arytenoid muscles. By contributing to the approximation of the lips of the glottis, the inferior constrictor of the pharynx concurs to the production of the acute sounds, but if the larynx were immovably fixed, the greater or less contraction or relaxation of the glottis would alone produce all the tones of the human voice.

It is easy to perceive from these observations, that I am not of the opinion of those physiologists who assert, that the variations in capacity and length of the vocal pipe exert a great influence over the production of sounds. I am far from believing that these variations are of no avail in the emission of the voice; I am simply of opinion that their influence is generally exerted only upon the timbre and force of the sounds, but that they have no participation in the production of the tones, which, as I shall endeavor to show, are entirely formed by the glottis. In fact, the length of the vocal canal does not vary sufficiently to account for the numerous and varied tones produced by the human voice, and which sometimes embrace three octaves or forty-eight semitones; the larynx, which can, under ordinary circumstances, only be displaced an inch, consequently shortens the vocal tube only a fifth, which would give merely the three major below the first tone, and not the double or triple octave. *Cuvier* said, that these acute octaves were only the harmonies of the low octaves; to admit this opinion, it is necessary, which is contrary to the fact, that the larynx should not have changed its position to produce the acute notes. Neither can the movements of the lips and of the tongue

cause any variation in the tones of the voice ; for articulated singing would be very difficult, and would require for its production the larynx to change its place with every different syllable. Moreover, by shutting the mouth the tone should be changed ; nevertheless, it is not so, and the *sound only* is modified by becoming more dull. Finally, by stopping the nostrils, and adapting to the orifice of the mouth a long tube, and even a common ear-trumpet, the gravity of the sound ought to be augmented, while it is merely rendered more sonorous and intense. The result of all these considerations was, that I was naturally led to doubt the assertions of physiologists, who contradict each other very often, and could not conceive why they have always had such a rage to compare the mechanism of the larynx to that of the different musical instruments ; it seems to me, on the contrary, that it would be more natural to compare these latter to the larynx, which is the most ancient and harmonious of all instruments. I say, then, that the larynx resembles nothing but a larynx, and that the admirable organ of the voice is a wind instrument, *sui generis*, inimitable by art, and the living mechanism of which cannot be compared to that of any other, because the principles of the animal

organization can never be communicated to a mechanical instrument, and because man will never have at his disposal the elements of vital action.

But, I shall be asked, since you do not admit the theories of physiologists, what explanation will you give of the formation of the voice?

First, I shall reply, that I do not pretend to give explanations more mathematical than other persons, but simply that the glottis is the instrument that produces the sounds, or rather it is the air driven out from the lungs, which, under the influence of the will, by breaking against the lips of the glottis, produces sonorous undulations, modified by the pharynx, the tongue, the lips, the nasal fossal; finally, by the entire vocal apparatus. I think the formation of the vocal sound can be conceived of without having need of sonorous cords or vibrating reeds, and the production of the voice and its different modifications may, indeed, be the result of a large or small opening of the glottis, caused by the contractions or relaxation of its lips. Every body knows, too, that the constriction alone of the lips expresses, by whistling, varied and even harmonious sounds; and that the air and different gases may be expelled from the body of animals with

certain modulations from openings, where, so far as I know, the existence of a *reed* or of *vocal cords* has never been suspected.

The oscillations of which the lips are the seat in playing upon the horn, may equally aid us to prove that the muscular edges of an animated opening can vibrate in consequence of the contractions to which these edges are liable, especially when these vibrations are excited by a current of air which alone is the material and the producer of the sound. I shall, perhaps, be asked, if I do not admit the vibrations of the glottis as productive of the vocal sounds, how I will explain the vibrations of the thyro-arytenoid muscles which are felt by carrying the hand to that projecting and external part of a thyroid cartilage, vulgarly called *Adam's apple*; they will also probably tell me that since nature has willed these vibrations to take place they must necessarily have a useful object.

To answer, at the same time, these two objections, I will say that it is the air which, by its more or less rapid passage across the glottis, puts the vocal cords in vibration, as in speaking it causes to vibrate all the other parts of the vocal apparatus, especially the nasal cavities and their

cartilages.* These vibrations of the glottis and of the other vocal organs impart to the voice, by successively lengthening and shortening the muscular fibres, the kinds of sonorous undulations which render it more sweet and harmonious, and which give it a flute-like sound, similar to that drawn by our celebrated violinists from their instruments, in consequence of a sort of trembling that they communicate to the cords by varying the pressure of the end of the finger upon them.

The mechanism of the vocal instrument, although still shrouded by an impenetrable veil, may then be understood, as I conceive it, without being obliged to compare it to the other musical instruments; besides, these instruments which have been created only to imitate or sustain the human voice, are not only very far from having sounds as melodious and as beautiful, but also from uniting in the same degree of perfection the conditions most favorable for the production of sounds, whether we regard the timbre or the harmony. It is probably for this reason that the instruments which approach the nearest to the human voice have a more touching ex-

* Any one can satisfy himself of these vibrations, by placing his fingers upon the wings of his nose, they will thus be rendered very apparent.

pression and go more directly to the soul,* and art will never succeed as well as nature in the production of an organ admirable for its great simplicity, and animated by a principle which, without doubt, will always be unknown. The vocal organ is, then, the most beautiful instrument; since man can, by exercise, master at will his voice according to the rules of taste and harmony, and produce those enchanting sounds which excite in us the purest pleasures and the most delicate sensations.

I must, however, acknowledge, that those who make researches upon this material, will rarely agree together, since the organ of the human voice does not produce in the same manner all the tones belonging to it. The sonorous voice of singing and speaking, which in a theatre may be heard by two thousand persons at the same time; the low voice with which we sing in a closed apartment; finally, this acute voice which has received in our language the name of *falsette*; all these voices must depend upon different mechanism, which will be examined by us in the following chapter.

* There is nothing in this world more terrifying than the cries of a man in great danger. Each time that I have heard these horrible cries, they have remained for a long time in my heart.

CHAPTER IV.

THE FAUCETTE, OR PHARYNGEAN VOICE.

FROM what has already been said it will be seen, that we have sought to demonstrate, that the glottis was the organ essentially concerned in the formation of the voice, and that the various alterations, of which the vocal tube is capable, were not intended to render the sounds more or less acute, but simply to render them more or less intense, and more or less clear, according to the form taken by the tube. But if in the greatest extent of the musical scale, the glottis is the organ generating the sounds, it is not so, in our opinion, when the larynx has reached its highest point of ascension; then the diapason of the natural voice is carried beyond its capacity, and the singer is obliged to have recourse to another kind of voice depending upon a peculiar mechanism. The point of departure of this new series of tones is fixed after the last note of the first register; that is, at the first note of the second,

and may often be carried to the octave of this note in some individuals.

To the union of the sounds constituting this second register has been given the name of *voice of the head* or *falsette*,* to distinguish it from *the voice of the chest* or of the first register, which we call the *laryngean* voice, as being formed by the larynx alone. But, I shall be asked, if you admit a new mechanism for the formation of the sounds in high singing, that is, when the larynx is carried to the highest possible point, what organ participates the most in it? In reply to this question I will say, that the acute notes depending on what is called the *faucette*, arise from the almost exclusive employment, or rather from the forced contraction of the superior part of the vocal apparatus. To enable our ideas to be more readily understood, let us observe in the first place, what takes place when the larynx is carried to the highest possible point, and the glottis has just given out the highest note of which it is

* This word should be written *faucette*; for I cannot admit the etymology of the lexicographers, who write *falsette*, as if derived from *false*, the opposite to *true*, and therefore prefer, as more rational, and more conformable to my ideas, the etymology of the Latin *fauces*, *faucium*, the throat, the gullet. The orthography should, therefore, be changed. I have also, in support of my opinion, that of J. J. Rousseau, who, like myself, attaches no idea of *false* to the acute sounds of the voice.

capable. Then elevated by the contractions of the *thyro-hyoid*, *genio-hyoid*, *mylo-hyoid*, *stylo-hyoid*, the *digastric*, the *genio-glossal* and *hyo-glossal* muscles, and, finally, by the *inferior constrictors of the pharynx*, the vocal instrument is fixed and restrained by the action of the *hyo-thyroid*, *lateral*, *hyo-arytenoid*, *oblique* and *transverse*, and the *inferior* and *superior thyro-arytenoid muscles*; at the same time, the pharynx is contracted and compressed, the veil of the palate is strongly stretched and raised so as completely to stop up the posterior orifices of the nasal sinuses; the uvula is shortened even to its obliteration in the highest notes, the tongue is contracted and elevated to its base by the contraction of the *glosso-palati* muscle, the columns are approximated and strongly marked; the tonsils are swollen and form a considerable projection; the opening of the windpipe is contracted; finally, the vocal sound no longer issues in part through the nose,* but rings in the mouth

*This is the reason why women in general, tenors and sopranis, are less easily understood in the singing of words than the baritones and base. It is almost impossible for acute voices to pronounce distinctly the nasal sounds, especially in the high notes of the fauette. This peculiarity will be readily understood by reflecting, that for the articulation of the nasal syllables, the air must issue through the nose; but, as in the fauette, the veil of the palate opposes this passage of the air, the syllable *in* must necessarily take the sound of *a*, exactly as the 'sound *a* must, in its turn, take that of *in*, when the effort is made to pronounce it with the mouth closed.

after having been produced by the air, which breaks in a delicate stream against a new glottis formed by the veil of the palate,* the base of the tongue, and all the contracted and approximated organs we have mentioned. The form of the vocal tunnel, in particular, appears to undergo the greatest change; really, in the *laryngean* voice the tunnel has two external orifices, the nose and the mouth; it is curved backward superiorly. On the other hand, in the *faucette*, it has but one orifice and a vertical and straight direction, favored by the elevation of the larynx, and the head bent backward, which facilitates the contraction of the organs and prevents the sound from issuing by the sinuses of the nasal cavities. Finally, in the voice of the first register the bucco-pharyngean cavity forms two hollow cones, the bases of which turned towards the glottis are confounded together, and the two distinct summits of which are anterior; on the contrary, in

* May it not be admitted, that all parts of the pharynx which contribute to form this new glottis, are capable of producing vibrations, as the vocal cords? This is my opinion; and I think these vibrations may be compared to the labial vibrations produced by the lips, when, by forming with them a kind of sphincter, and an opening to give passage to the air which breaks against their borders, it is desired to imitate certain noises and sounds, such as the noise of a turning wheel, that produced by the wings of a large fly or bumble-bee — finally, the sound of a horn or bassoon, or the scraping of a bow upon a violin, etc.

the voice of the second register, the mouth and pharynx form but one cone, with the summit posteriorly and base anteriorly.

During the mechanism of the *faucette*, the larynx, or rather the glottis, no longer vibrates in an evident manner, its purpose then is to contract considerably the orifice from which escapes the delicate stream of air, which, with that already found in the larynx, is sufficient for the sounds of the *faucette*. For the more satisfactory explanation of this idea, and especially to prove that it is sometimes possible to speak without the assistance of the larynx, I will relate some facts ; among others the following, furnished me by Dr. Delean, and which I have since repeated. This ingenious physician, to whom science owes several important works upon the diseases of the ear, addressed a letter, in 1829, to the Academy of Sciences, in which he said : “ Introduce through one nostril into the pharynx a hollow tube, which will permit the passage of a current of air contained in a vessel of moderate capacity ; as soon as you feel the current of air strike upon the posterior walls, suspend the action of respiration and put in motion the organs of speech, as if you were acting upon the air of the lungs ; you will speak in a low voice, you will cause distinctly to be heard all

the elements of aphonic speech. Fearing to be deceived with regard to the power of interrupting the action of the chest, while I put in play the organs of speech, I attempted to speak in a loud voice ; the current of air established by the nose was in all its force ; at the instant two words could be heard in a manner so distinct and pure, that those who assisted in the experiment thought they heard two individuals repeating the same phrases. This experiment therefore satisfactorily proves, that the larynx is of no utility in aphonic speech."

Struck with an experiment so conclusive, I tried upon myself, whether I could not produce, at the same time, two vocal sounds of different mechanism ; that is to say, a note of the *larynx*, and one of the *faucette*. I accomplished this result very readily, by taking at once a grave note by a strong vibration of the glottis, and its octave with the *faucette*. Two notes can thus be distinctly heard ; although they have not a very clear sound, and are somewhat hoarse, they form a kind of harmony which, in connection with the experiment of M. Delean, proves that the larynx is not always the generating organ of the voice ; and that the veil of the palate, the uvula, and the organs of the isthmus of the windpipe, form, by their forced contraction, another kind of vocal

instrument, which does not depend upon the larynx, except in so far as the air is furnished by the latter.

I expect this theory will meet with many attacks, but as it has some analogy with that of Professor *Gerdy*, of *Malgaigne*, and *Bennati*, the attacks upon myself will appear less vivid, and I shall feel stronger in reply, since I do not stand alone.

Moreover, the word *faucette*, which is derived, as I have already said, according to J. J. Rousseau, from the Latin *fauces*, the throat, and not from *falsus*, false — seems to indicate that the ancients had some idea of the formation of acute sounds, and that they considered them to be produced by a peculiar mechanism of the superior parts of the vocal tunnel. *Ferrein*, after having placed the organ of the voice in the *vocal cords*, considered as cords, adds : “ I find myself obliged to make a restriction wholly unexpected, that the vocal cords are not the organs of all kinds of the voice ; such are a certain voice of the windpipe and a falsetto of the same nature.” “ These require a new organ which I have discovered, and the existence of which I have taken care to establish ; these facts will be explained in another article.” Although *Ferrein* lived a long

time after his pretended discovery, he never published any thing respecting this article, which he promised, and we are reduced to conjectures with regard to its contents. Haller supposed that he referred to the veil of the palate : *Quin aliquæ non litteræ solæ, sed etiam voces per guttur edantur, et quin earum modulatio aliqua per palatum mobile aut proprias ad linguam adductum, aut vicissim remotius exerceatur.* Dubium quidem non videtur esse illud peculiare vocis organum quod se descripturum promisit Ferrinius, etc.

A German author also says some words upon the *faucette* voice, which he calls *vox substricta*, and the *chest voice*, *vox plena*. This author, *Helwag*, of Tübingen, says only : *Ad substrictam vocem uvula contrahitur, ad plenam non mutatur.*

From what has been said it will be seen, that we are not the first who have spoken of a mechanism, other than that depending upon the muscles of the larynx, for the formation of the *faucette* voice ; but as we do not share the opinions of other physiologists in this respect, we will point out in what they differ from our own.

Firstly, so far as concerns *Ferrein* and Dr. *Helwag*, we do not think it necessary to say any more, for they have but glanced at a different

vocal mechanism for the acute notes, without giving any more than we have cited.

The theory of *Bennati* differs from our own in several respects. In the first place, this physician says that the acute sounds are not produced by the contractions of the muscles of the veil of the palate and of the isthmus of the windpipe, but that *he, with all the physicians and physiologists who have been engaged upon the voice, admits, that the formation of the supra-laryngean sounds is effected like all the others in the larynx, but that they are merely modified by the superior part of the vocal tunnel.* We assert, on the contrary, that the glottis is of no utility in their formation, and that they are produced by another species of superior glottis, formed by the elevation of the larynx, and the contraction of the muscles of the pharynx, veil of the palate, base of the tongue, etc.; that is to say, by the contraction of the *internal and external peristaphyline, the palato-staphylins, glosso-staphylins, pharyngo-staphylins, stylo-glossal, stylo-pharyngean, mylo-hyoid, genio-hyoid*; finally, of the *palato-pharyngean, and glosso-pharyngean.* M. *Bennati* assigns to the larynx an important part in the sounds which he calls *supra-laryngean*, while we look upon it merely as a continuation of the trachea, and serving

only as a *blow-pipe*, and a point of support which contributes, by its closure and the contraction of its muscles, to form in the isthmus of the windpipe the new superior glottis we have first mentioned.

The organs, whose simultaneous approximation forms the new glottis, which generates acute sounds, are, 1st, inferiorly the summit of the larynx and the base of the tongue — to which, in my opinion, M. Bennati assigns functions of too much importance in singing ; 2d, the pharynx, or posterior wall ; 3d, the columns and tonsils at the sides ; 4th, the veil of the palate and the uvula ; which, by their elevation, prevent the air from issuing by the nasal fossæ, as in the chest voice.* When all these parts are approximated by the contraction of the muscles, the *bucco-pharyngean* cavity forms a cone, the base of which corresponds to the opening of the mouth.

Neither do I share in the opinion of M. *Bennati*, when he says that the hyoid bone and the base of the tongue must be fixed for the formation of the acute or supra-laryngean sounds ; this fixing

* When in the chest voice, and during the articulation of words, the air does not issue from the nasal sinuses, the voice is harsh and nasal ; in the *faucette*, on the contrary, the air should only issue by the mouth. Thus those who have a nasal and disagreeable voice in the middle sounds and the base notes, may produce sweet and harmonious sounds by taking the *faucette*.

might be imagined necessary for the production of the sounds in modulated singing ; but in spoken singing, this theory is inadmissible, for the base of the tongue, as well as the entire organ, is obliged to make a great number of movements for the articulation of the words.

Gerdy and *Malgaigne* have simply described with great accuracy the movements of the veil of the palate, and of the organs of the superior part of the vocal tube, but they have not said that these movements had for their object the formation of the notes composing the second register, and that their approximation gave origin to another instrument, the only generator of the acute sounds, without the participation of the true glottis. The former is not formed until the latter has exhausted all its notes, and produced its highest diapason.

By simple inspection of the vocal organs, it is easy to recognise the kind of voice of each individual ; the differences of conformation and especially of capacity of these organs are so sensible, that it is almost impossible to be deceived in this respect.

Singers with an extensive voice, especially in the high notes, such as sopranis and tenors, have the upper portions of the vocal apparatus much

more developed and more movable than the base. In the latter, the larynx is larger and descends to the very middle of the neck ; the anterior projection of the thyroid cartilage (Adam's apple) is more distinct ; the nose is longer ; the nasal sinuses are more extensive, perhaps because the air is constantly traversing them,* the shoulders and chest are larger ; but the mouth on the contrary is smaller, the veil of the palate thicker and not so large, the uvula less projecting and movable ; finally, all the parts constituting the isthmus, properly so called, are in general more contracted. In tenors and soprani, the figure is smaller, although the posterior fauces are larger ; the larynx ascends under the lower jaw, the nostrils are sometimes so narrow, that they scarcely permit the passage of the air, but the uvula is developed and very contractile, the veil of the palate larger and thinner, and the tongue is proportionately thicker and larger. The reason why these organs are more developed in the soprani is, perhaps, that singers of this species of voice exercise more frequently the superior part of the

* In the voice of soprani, the air does not issue through the nasal fossæ except in some notes of their first register ; in base voices, on the contrary, it always issues in a great measure by the nose, for those persons who have a very grave voice can scarcely ever take the faucette.

vocal tube ; thus these portions are never more fatigued than after the parts which are written to be sung in the high notes of the second register, which require the faucette. This fatigue, experienced by soprani singers, rarely extends beyond the limits of the summit of the vocal tunnel, and if increased by too long an exercise it might occasion a pharyngitis ; but this inflammation, which sometimes extends to the larynx and even to the trachea, would never reach the bronchi or the lungs. On the contrary, in base and other singers whose voice is almost always in the first register, the fatigue is principally felt in the larynx and the organs of the inferior part of the vocal apparatus, such as the lungs, pleuræ, and all the pectoral and diaphragmatic regions ; in consequence of which, inflammations of the trachea and bronchi and peripneumony are not rare in those who sing almost exclusively parts written in the first register ; although the fatigue is less speedy in singing in the grave tones than in the acute.

The diseases of the vocal and respiratory organs are not the only complaints, to which singers are liable ; and we will now point out various accidents peculiar to each class, and which are so entirely distinct as to require particular attention.

The voices of the first register, especially the base, relax the muscles of the abdomen and peritoneum; whence the disposition to hernia and ventral obesity contracted by singers of this class. *Ramazzini*, *Fallopis*, and *Mercurialis* ascribe to this cause above every other the great number of abdominal hernias, which were met with among the monks, who sang with grave voices for the greater part of the day in the churches. Acute voices send the blood towards the superior parts, and predispose to cerebral congestions. In fact, if you examine a person who is giving a sound in *faucette*, you will observe the face to be red and tumid, and the muscles of the countenance to be strongly contracted; that the vessels of the neck and forehead are swollen and very apparent; finally, that the eyes are injected, fixed, and brilliant. Female singers, tenors and sopranis are very liable from the exertion of singing in the high notes to vertigos, headaches, bleeding at the nose, ringing in the ears, strong pulsations of the temporal arteries, and even to various nervous affections, which *Ramazzini* claims to have observed.

The exercise of singing when too long continued, fatigues much more than that of speaking, although the latter requires the concurrence of a

much greater number of organs. Singing actually demands the most ready and best sustained action of the larynx, which is, on the one hand, soon dried by the rapid and continual current of air which traverses it; while, on the other hand, the lungs largely dilated by this fluid retain it for a longer or shorter time, contrary to their natural function and the mechanism of respiration. As the air intended for the instrument forming the voice must be driven out from the lungs without interruption, its issue is always very slow and greatly prolonged; and it is, in my opinion, one of the most important and difficult things for a singer to know how to renew, without interrupting the sound, his supply of air, by making an inspiration at the very moment when the measure marks the natural repose of the musical phrase.

The result of these different phenomena which we have noticed in singing is, that the glottis and the entire larynx are fatigued by the frequent and prolonged contractions and vibrations of the muscles, which put them in motion; the mouth and throat are dried and irritated; the act of respiration, modified in its mode of action, soon wearies the inspiratory organs, and the delay in the supply of new air to the lungs, causes the oxygenation of the blood to languish, as well as the

chemical action of this function. The circulation, so closely united to the movements of the organs of respiration, is soon embarrassed; the blood stagnates in the pulmonary artery; the whole venous system discharges its function badly; the jugulars are swollen, and the cerebral veins, soon gorged by the blood, are distended by this fluid. This disorder of the respiration and pulmonary circulation often causes its bad influence to be felt in the abdominal viscera, the natural motions of which are delayed, because they remain during the entire inspiration in a state of uneasiness and compression, which is particularly painful to the stomach, especially after eating, when this organ is distended by food.

All these disorders of the circulatory and respiratory functions, that we have pointed out, do not become very manifest, until the singing is prolonged beyond measure, or when the singer makes great efforts, especially in a different register from that which is natural to his voice. Then hoarseness and even complete aphony takes place, and the vocal sounds lose all their brilliancy, sweetness and harmony. A sense of heat is at the same time experienced in the chest, and a kind of dryness and fatigue in the throat; the respiration is rendered more active, the arterial

pulsations are more frequent, and there exists in the throat a sort of constriction, which is rendered more painful by the constant thirst. Often, too, the cutaneous perspiration is augmented, and the whole capillary system of the skin, more particularly that of the face, is injected with blood ; lastly, this state of fatigue and this disorder of the functions might even be attended with more serious consequences, if prolonged repose and well-directed care did not soon reëstablish the harmony and the health of the system.

Most of the serious results spoken of are considerably diminished by the happy effect of frequent singing ; they are even in a great measure redeemed by several advantages to be found in the practice. The first of these advantages is the better development of the chest, and the strengthening of the vocal and respiratory organs, at the same time that our animal economy experiences the happy effects of an exercise filled with charms, and which exerts its sweet influence over our feelings and ideas.

The most natural object of singing is to express pleasure and joy ; and with truth has *Gretry* said, that singing is to man the sign of his perfect happiness and liberty ; wherever he may be, the

happy man sings, and thus manifests the lively sentiment of the happiness he experiences.

The charm which always accompanies singing will suffice to indicate how many advantages those who give themselves up to it with discretion and moderation may derive from it. The first of these advantages, which consists in a salutary movement impressed upon the whole body, must, I think, be referred to gymnastics and hygiene; disguised as an exercise, singing may be useful in a multitude of circumstances, and, above all, eminently capable of strengthening the thoracic and vocal organs. In union with music, it often produces great effects upon the nervous system, and may be made the means of cure in many nervous diseases. *Oribazius*, in his collections, gives some useful and interesting details upon the good effects of singing in preventing, curing, or alleviating a great number of diseases, as those of the lungs, bad digestion, the depraved tastes of females enceinte or chlorotic. *Plutarch* considers that the exercise of the voice may contribute to the health of the body. *Celsus* boasts its utility in weakness of the stomach; *Celius Aurelianu*s against pains in the head, mania, and catarrh.

The moderate exercise of singing may also be

advantageous in those affections with which the imagination is much occupied, such as dyspepsia, and gastro-enteralgia ; by serving as a means of distraction, and dissipating the idea of the disease, it will be made to disappear in part. A great many facts prove that singing joined to music is also very favorable in certain epidemics, especially as a protective measure, and the observation we have just made during the epidemic of the cholera, proves to us that those who were occupied with singing and music have but rarely been attacked by this terrible scourge.* *Hippocrates* and other physicians of antiquity have also recommended the practice of singing ; but, like modern authors, they could not agree upon the cases requiring it. We consider, however, that the moderate exercise of singing, speaking, and of declamation, may be proper for persons of

* In epidemics and other scourges of this kind, such as the cholera and the plague, which desolate an entire country, many persons fall victims to terror rather than disease. Reason and observation equally prove how useful singing would be to them, since it has always the property of dissipating their terror. It often happens that the mind, constantly occupied by the fear of the disease, calls for it, so to speak, and gives it birth. *Diemerbroek*, in his 'Treatise upon the Plague', pp. 286, 232, 252, cites several cases of the plague cured by singing and music. *Pigray*, who says that sadness and fear are the nourishment of the plague, also cites several observations of the same kind. *Desault*, too, declares that singing is advantageous in the treatment of insanity and consumption.

little activity, who have naturally a veiled and hoarse voice, and whose lungs, well formed in other respects, lack tone and energy, and are therefore more exposed to a species of cold or mucous embarrassment.

Singing was much esteemed by the ancients, and the Greeks, in particular, employed it to inculcate morality. *Bartholemey* relates that the youth, accustomed at an early age to sing, found in this exercise the love of good and the idea of true virtue. Their songs, by turns patriotic and warlike, melancholy and voluptuous, attached them to their country, carried them to battle, and disposed them for the sweets of peace and the pleasures of love.

Although singing is less esteemed among us, it always gives pleasure to all men, and we find it practised with equal delight by the shepherd and the soldier, the mechanic and the noble. It forms, when united to music, the chief ornament of our large assemblies and our theatres, and it furnishes in our churches the truest and most touching accents, which can be inspired by piety, grief, gratitude, or adoration. Who has not felt his soul elevated to God by holy hymns? and whose eyes have not filled with tears, whose heart has not been touched by hearing funeral and religious songs?

Before terminating my remarks upon the voice, I will add some words upon its metamorphosis at the age of puberty. At this period a great revolution takes place in man, and the vocal timbre is completely changed; for the voice, in boys especially, usually loses an octave. At this critical period very great precautions must be taken, that the exertion of singing does not occasion a weakness of the vocal organs, by which their development might be arrested. *M. Bennati* has given, in his treatise upon the voice, some excellent precepts with regard to the precautions to be taken at the season of puberty. As we have nothing to add to what has been said by this physician upon this subject, we shall here make an extract from his work. “Devoted at a very tender age, by pleasure and taste, to the study of singing, I possessed a very well-marked soprano voice. At the period of change, which occurred to me at fourteen years of age, my master ceased his lessons for several months; after this interval, he remarked that my voice had lowered precisely an octave; but perceiving that I still touched, although imperfectly, some of the higher notes, (which he called falsetto notes,) he encouraged me to practise them gradually and without effort, by telling me that they would finally procure for

me a second register, which, although distinct, would be in unison with the first, and would greatly increase my resources. To this moderate study I owe the development of the organ, which now can mark three octaves."

"These observations will not be without use in the direction of singing-masters, as well as the parents of children having a predisposition to the development of the organ of the voice. After having first prepared the hearing of the latter with a taste for music, which they should study mechanically till about the age of seven years, it will be best, as soon as they have been taught to open the mouth, and give it the most favorable form for the projection of sound, to make them execute gradually, and in very slow movement, not entire gamuts, as is usually done, but merely the notes they can sound without effort. Great care must be taken not to prolong this exercise more than a quarter, or at most half an hour each day, according to the constitution of the subjects, for fear of doing injury to the organ of the wind—that is to the lungs and their dependents—which would readily occasion results similar to those I have already pointed out, as the consequence of the exercise of singing during the change of puberty.

“ By following the course I have indicated, the teacher disposes to contract spontaneously, under the influence of the will, the muscles, which, after they have reached their entire development, will possess both flexibility and power.

“ This suppleness and play are precisely what is wanting to those persons, who commence the study of singing at a late period of life; the muscles having till then remained in vocal and modulating inactivity, oppose more resistance and rigidity to the will, because they have become fully developed. Perhaps these remarks ought to be taken into consideration by the directors and masters of musical societies, to whom I doubt not that the more perfect knowledge of the vocal apparatus, joined to the history of the former musical education of the pupils, would be of very great utility, in enabling them to discern those subjects which have a real aptness for singing. I dare almost affirm, that the meagre quality of the voice, which is reasonably complained of from fifteen to twenty years of age, has for its first cause the irrational direction which is given to the organ of children, among whom the happiest organic arrangements are often made of no avail by exercises, not only premature and beyond the vocal strength of the individual, but even at peri-

ods contrary to vocalization, which has a special modulating power entirely distinct from that which belongs to an inorganic instrument."

Our opinion, as may be imagined, is the same with that of M. *Bennati*,—that it is of the highest importance to permit the young pupils to sing only those pieces of music, which are entirely within the scope of the voice, and which do not expose them, in consequence of too great and prolonged efforts, to lose the happy dispositions they may have for singing. If certain musical compositions have changed the voice, and even taken away all their powers from persons, whose voices were already formed, with how much stronger reason would music of the same kind prevent the development of the vocal organs in young, feeble and delicate subjects.

As the study and habitual exercise of singing are followed by real dangers, I think best to point out in this place what conditions are necessary to render singing always compatible with the preservation of the health; it is not sufficient that a singer has a pure and sonorous voice, a delicate ear, a just intonation; in addition to these advantages he must possess a well-formed chest, healthy and ample lungs, easily contracting and

expanding ; his neck should be well proportioned, that is, neither too short nor too long.

Even when all these conditions are united, he must, as we have already said, always keep within the scope and character of his voice, and be careful to sing with moderation, never exceeding his powers. If a singer, who practises his art much, would preserve his organ for a long time, he must carefully avoid every error in regimen, and lead a most regular life. Singing, to be easy and pure, requires that the stomach should contain but a small quantity of food, and that the abdomen, chest and neck should experience no uneasiness or compression. If most of these conditions are not present, the exercise of singing may be attended with grievous results ; and it would be well to forbid it to those persons, who are far from having the happy conformation of the organs which singers should have. Delicate and nervous persons, whose chest is narrow and irritable ; young persons scarcely developed ; those who are predisposed to cough, and easily take cold ; finally, invalids, especially those with pulmonary tubercles, sooner or later find in the prolonged exercise of singing the cause of a disease, to which they very often succumb. In fact, nearly all these victims of the voice become haemoptisi-

cal, or are attacked with pulmonary or laryngeal phthisis. These counsels, which all those who are destined for the stage, and all professors of singing, should never lose sight of, may be of the greatest utility, and will certainly contribute to increase the number of singers with extensive and flexible voices, who often lose all their powers by the irrational direction which is followed in their musical and vocal education.

It has already been shown, that the play of each part of the vocal organ depends upon the will, and that we can at pleasure vary the force, tone, and timbre of our voices, so as to produce the most extraordinary and varied illusions. For instance, by putting in action in a certain and particular manner, this or that part of the speaking apparatus, we succeed in perfectly imitating the cries of animals, the voices of other men, and even the most confused noises. As we cannot here enter into long details upon this subject, we will content ourselves with a few words upon that illusion of the voice, which is called *ventriloquy*, or *engastrimysm*.

Engastrimysm — from the Greek *εν*, *in*; *γαστηρ*, *the belly*; *μυθος*, *speech*; meaning *speech from the belly* — is a kind of hoarse voice, some-

times distant, sometimes near at hand, which produces the most varied vocal illusions.

The *ventriloquists* were formerly regarded as possessed of the devil, because ignorant and superstitious men have always attributed to supernatural causes every thing which exceeded their comprehension ; but now that the progress of science has in part dissipated the darkness of superstition, and illumined the horizon of the human mind, our ideas with regard to ventriloquism have become more exact, and it is generally agreed that this art may be learned like any other, and that its effects, in appearance magical, are due to a peculiar order of action of the vocal organs.

But, I shall be asked, What is the mechanism which produces this peculiar illusion of the voice? Before expressing my own opinion upon a subject so little studied and known, I will briefly allude to those of physiologists and ventriloquists, which very often contradict each other. It was formerly always supposed, and nearly every body still believes, that the voice of ventriloquists was produced in the belly ; and from this idea the name of *ventriloquy* was unfortunately created. *Rolandi* said, that when the two pleuræ, usually united by the fold of the mediastinum, remained

separated, the voice seemed to come from the pectoral cavity, and the individuals were ventriloquists.

Amman, Nollet, and Haller, said that the voice of ventriloquists was formed during inspiration.

In 1770, *Baron Mengen*, an Austrian colonel, who was a ventriloquist, gave the following explanation, the truth of which he had verified, he said, upon himself; the tongue was pressed against the teeth, and the left cheek circumscribed about it a cavity, in which the voice was produced by the air held in reserve in the throat. The sounds then had a hollow and hoarse timbre, which gave rise to the opinion that they came from a distance. It was necessary, according to him, to husband the air, and respire as seldom as possible.

Dumas and Lauth said, that ventriloquy was a rumination of the sounds, which, after being formed in the larynx, were driven back into the chest, where they received a peculiar timbre, and made their way out with a hoarse and distant character, which was the cause of the illusion.

Richerand and Fournier are of opinion, that the voice, formed in the glottis, is afterwards crowded back into the lungs, whence it only issues in a gradual manner, to be then stopped by the

larynx, which acts like the sounding-board of a musical instrument.

Comte, our celebrated ventriloquist, says that the voice is formed, as usual, by the larynx, but that the play of the other parts of the apparatus modifies it, and that inspiration directs it into the thorax, where it resounds.

Finally, *Dr. Lespagnol* has maintained in a thesis, that it is principally by the veil of the palate that the sounds can be so modified as to graduate the intensity of the voice, and produce the illusion of ventriloquism. This latter theory very nearly approaches my own, for it differs from it only in that its author merely speaks of the action of the veil of the palate, and says that it is only this action, which produces ventriloquism by preventing the air from issuing through the nasal fossæ. The whole difference, says *M. Lespagnol*, which exists between the near and the distant voice is, that in the former are heard the sounds which issue from the mouth and nose, while in the latter they issue only from the cavity of the mouth. The remark of this physician, with regard to the issue of the air, may be verified by any one, especially if he will employ the vocal mechanism about to be indicated as being, in my opinion, that which produces ventriloquism. Thus

we see that to speak like ventriloquists, or rather *to speak from the abdomen*, as it is improperly called by people in general, will not require a peculiar conformation of the organs of respiration and of the voice ; it is sufficient merely to be possessed of a certain elasticity of the upper part of the speaking apparatus, and, with a little skill and practice, it will be very easy to produce all the vocal illusions constituting the art of the ventriloquist.

As, on the one hand, men have in general a secret and involuntary inclination, which leads them to imitate all the actions witnessed by them, and since, on the other hand, it has been observed that of all our organs none is better adapted for imitation than that of the voice, it will not, in my opinion, be advancing too much, to assert that a person, especially if young, who should live in the company of a ventriloquist, would soon almost involuntarily become so himself ; exactly as two individuals, who live a long time together, finally have the tone of their voices in harmony, and what is still more admirable, their voices acquire nearly the same timbre.

Convinced that to be a ventriloquist it was sufficient to have well-formed and very movable vocal organs, as well as lungs very ample and

permeable to the air ; and as, moreover, I thought all these conditions my own, I succeeded by making experiments upon my own voice in closely imitating that of the ventriloquists. A certain degree of skill, and the faculty so predominant among them of imitating all the vocal inflexions, were only wanting to produce all the illusions of their art.

When it is my intention to speak with the voice of ventriloquists, I employ the following mechanism : at first, after having made a deep inspiration, the object of which is to introduce into the chest the greatest possible quantity of air, I strongly contract the veil of the palate, in order to elevate it so as completely to stop the posterior orifice of the nasal fossæ. At the same time, I take equal care to contract the base of the tongue, the pharynx, the larynx, the columns, the tonsils, while I fix the point of the tongue behind the teeth of the upper jaw, and apply the dorsal face of this organ against the palatine vault. I cause the emission of my voice to be made with the expulsion of the least possible quantity of air from the lungs, and I easily obtain this result by forced contractions of all the muscles of the abdomen, chest and neck.

The principal secret of the ventriloquists then

seems to be, to prevent the air from issuing by the nose, and to compel this fluid to escape by the mouth in a slow and forced manner. The voice is thus rendered hoarse, and seems to have the weakness and timbre, as if it were from a distance. To increase the deception, by giving to the voice a sound which seems to come from a determinate spot, it is sufficient adroitly to direct the attention to this spot, and afterwards to speak in that direction by elevating in a greater or less degree the veil of the palate, so as to render the voice distant, or near, as the wish may be. The effort must also be made to speak with the least possible movement of the lower jaw, and to be careful to articulate in some sort with the mouth closed; finally, the ventriloquist should present his profile as often as he can, that his countenance may appear more at rest, and as destitute of expression as a blind man's; he will thus appear to take no part in the vocal sounds which are heard, and will easily succeed in producing a more complete illusion.

To finish what I have to say upon all the phenomena of the voice, I will add some words upon that expressive vocal sound, constituting what is called the *cry*.

The cry is a kind of inarticulate voice, com-

mon to men and animals ; the double sound resulting from it is with difficulty appreciated, and its intonation, which varies infinitely, cannot, for this reason, be noted and calculated in a precise manner. I think, however, as will soon be shown, that although the variable diapason of the different cries can hardly be known, it is not impossible to express approximately, by ciphers or musical signs, the intervals of the double sounds forming the cries peculiar to every pain. In general, the tone of the cries is much more intense than that of the modulated voice, and it always presents something sharp, noisy, and capable of a thousand shades. Every animal has a cry peculiar to itself, and which presents a special character, only understood by the animals of its own species. Cries are eminently adapted to call succor, to fix the attention, and to make known, by the character of their intonation and distinctive accents, the different sentiments they are intended to express. The cries of pain, and those of terror caused by an imminent danger, for instance, excite, in a very different manner, those who hear them. The former inspire compassion, the latter command us to act on the defensive, or induce us to fly ; the noisy cries of pleasure render us joyful, while the cries of

despair wound our hearts and fill us with sadness. Every grief has its peculiar intonation. Every pain has its peculiar intonation; the cries of physical are different from those of moral pains, and these differ among themselves according to the expression to be given. The mechanism of the formation of cries does not differ essentially from that of other vocal phenomena. It may be referred to the formation of sounds of the first register, and more particularly to that of the second register, or *faucette* voice. As no one, that I know of, has ever written upon the mechanism of cries, I will endeavor to make known the result of my own researches and observations.

In my opinion, cries are produced by particular efforts, exaggerated and fatiguing contractions of the vocal organs. The voice is at first laryngeal, or of the first register, and terminates by a prolonged and acute sound of the *faucette*, or second register. There are, therefore, two simultaneous mechanisms; for we hear at first a very brief laryngeal sound, which may be represented by a base octave, and the second, which is more prolonged, by its corresponding octave in the *faucette*. To understand our explanation of this double mechanism of the formation of cries, it

will be necessary to call to mind our remarks upon the formation of the different vocal sounds.

Pathologists and operating surgeons have not yet sufficiently studied the different intonations of pain; they have only observed a difference in the cries, according to the kind of operation and the circumstances. It would, however, be useful always to have these different intonations present in the mind, for they would sometimes aid in forming a more just diagnosis in diseases, and would often protect physicians from making errors of judgment. For the more satisfactory explanation of the result of my observations upon the different cries, I will take for diapason or point of departure, *do* below the lines, warning my readers that this note, which I have selected as a standard, may vary with the individuals, but that the intervals resulting from the double sounds, which produce the cries, are almost always the same, and may be noted approximately. Thus I have observed, that cries caused by the applications of fire are grave and deep, and that the double sound resulting from them may be represented by the *base octave* and its *third*; for example, the *do* I have just mentioned, and the *mi* on the first line. Cries which are drawn forth by the action of a cutting instrument during an ope-

ration are acute and piercing, and may be expressed, at first, by a rapid sound, or *a double crotchet of the middle octave*, which will be about *sol* on the second line; and afterwards, and almost at the same time, by a very acute and prolonged sound, or *a semibreve of the octave of the faucette*, which gives *sol above the staff*. The cries which result from pains occasioned by an acute affection, and not having for their cause an external action, are also represented by two sounds almost of equal duration, the *octave* and *its sixth*; the first corresponds to *do* taken as diapason, and the second to *la* within the staff; these cries are commonly called *groans*. The double sound resulting from the cry produced by a lively and sudden fright, or by an imminent danger, is the most discordant of all; it may be expressed by the *octave* and the *ninth*, the *do* below the lines, and the *re* within the scale. Finally, the cries from the tearing pains of labor are yet more acute and intense than all the others, and they have a peculiar expression well known and more remarkable; the double sound resulting from them may be represented by the base octave and the seventeenth; for example, the *do* and the *re*, upon the sharp of the second register. It seems that the atrocious pangs of

labor elevate the diapason of the voice, and at the same time augment its extent. I might also speak of the cries of joy and of sighs ; the former — formed equally by two sounds, one brief, the other prolonged — present an interval of one note only ; for instance, the *re* and *mi*. Sighs or tears are formed, at first, by three staccato notes, or three similar sounds produced during inspiration, and followed by a prolonged sound during expiration. The cry of sighing or of grief may be represented by three *black notes* and one *white*. Thus it is seen to be approximately possible to form a diatonic scale of the cries of pain.* It even appears that the spirit of invention, which torments mankind, and often causes them to imagine the strangest notions, has already led them to form with the cries of animals living organs, upon which they have succeeded in executing different airs.†

* The cries drawn from us by pain are a movement of nature, who seeks to relieve herself by producing a general expansion, and the fever which this occasions, concurs to generalize the evil for the purpose of diminishing its intensity ; it is thus that a color is weakened when combined with a liquid.

† I cannot pass over in silence the following anecdote, related by *Cahusac*, and which is to be found in the dictionary of music of the “Encyclopedie Methodique,” vol i. “John Christoval Calvette, who has given an account of the journey of Philip II. king of Spain, from Madrid to Brussels, tells this story : In a solemn procession, which was made in this capital of the Low Countries, in the year

If the beauty of my subject has led me into physiological considerations, perhaps of too great length, the conclusions which I have drawn from them are of the highest importance, since they will often aid in making clear the diagnosis and therapeutics of those affections of the throat which influence the organ of the voice.

Notwithstanding the numerous experiments of physicians and physiologists, and the precise information furnished us by anatomy and physics, these sciences will never be but imperfect auxiliaries, which will present no mathematical conclusions with regard to the different phenomena of the voice, because the power of life occasions in the production of the vocal sounds various modifications, the immediate cause of which will,

1519, during Ascension week, immediately after the archangel *St. Michael*, covered with glittering armor, bearing in one hand a sword, and in the other a balance, came a car, on which was seen a man disguised as a bear, who played upon the organ. It was not composed of pipes, like all other organs, but of cats enclosed separately in narrow boxes, so that they could not turn, their tails sticking out above. They were tied by cords to the stop, so that when the bear pressed upon the keys, he pulled the tails of the cats, and made them mew tenors, high and low, according to the airs he wished to execute. The arrangement was so made, that there was not a false tone in the execution. Monkeys, wolves, stags, etc., danced upon a stage carried on a car, to the sound of this singular organ." This history, translated by *Cahusac*, goes to prove that the cries of animals are a true singing, formed by various tones, and of appreciable intervals.

perhaps, always remain covered with an impenetrable veil, which the most skilful investigators will be able but imperfectly to raise.

In conclusion, who can ever explain in a satisfactory manner, why the will renders the air sonorous at the moment when it traverses the glottis, and why, when the empire of this power ceases, the passage of this fluid is effected without noise? We must put up with our ignorance on this subject, and say, with the Latin poet,

“ *Felix qui potuit rerum cognoscere causas.*”

Such is the history of the voice, with the physiological aspect of which we have been occupied, before entering upon the pathology and therapeutics of the organs which produce it.

CHAPTER V.

APHONY AND DYSPHONY.

“Non omnia omnibus prosunt auxilia.”

MORGAGNI.

APHONIA, of the Latin — from *a* privative, and *φωνη*, *the voice*, of the Greek — is an incapacity of producing the vocal sounds, which is always accompanied with a privation of sonorous speech.

Dysphonia — from the Greek *θυς*, *with difficulty*, and *φωνη*, *the voice* — is an alteration of the voice, which renders its emission more or less difficult, and often even painful.

These affections must not be confounded with muzzitation and dumbness; in the latter, the emission of the simple voice is uninjured, but not being modified by the motion of the tongue, lips, and other parts charged with the articulation of the sounds, they cannot, for this reason, be formed. In muzzitation, on the contrary, the motions of the speaking organs take place, but they are not preceded or followed by *any kind of vocal sound*, even the most feeble. In complete

aphony the sonorous voice is entirely destroyed, but the individual can, as is improperly said, *speak in a low voice*, and express his thoughts by the aphonic voice at short distances, which is not the case in muzzitation.

If, as those pretend who compare the larynx to a mechanical instrument, the voice were merely the result of the vibrations, which the air issuing from the lungs experiences when traversing the glottis, it would be very difficult to understand why this admirable organ is altered, or even entirely lost in many diseases, although the larynx often at the time undergoes no lesion or alteration, either in its muscles, membranes, or cartilages. These modifications must, however, depend upon a cause which requires to be sought for ; this cause, in our opinion, can only be a new mode of vitality impressed upon the vocal organ by the sympathetic reaction of some other affection more or less remote.

It may then be said, that the voice is not a simple vibration, but that it is living, and is animated like the organs which produce it. The voice being the sonorous expression of our sentiments, it must necessarily change with those which it expresses ; it must then be modified by the diseases which influence the vitality of the

whole system, or which react, sympathetically, upon the vocal organs.

Dysphony, or difficulty in the emission of sounds, and aphony, or complete extinction of the voice, are usually symptomatic, and cannot, for this reason, be studied by themselves in a practical aspect; but by considering these alterations of the voice as being the ordinary symptoms of some other affection, it becomes of the highest importance to give them the most serious attention.

The aphony which is observed in continued ataxic fevers, almost always renders the prognosis fatal; it is the same in adynamic fevers and inflammations complicated with adynamia, in which the alterations of the voice, joined to some other unfavorable signs, are almost always followed by death. The author of the book of the Coacians regards as a very bad sign, aphony accompanied with great weakness and a high and painful respiration. He considered the loss of the voice to be even more unfortunate in its influence upon the prognosis in acute diseases, especially in those which manifested themselves with much pain; it was the same in fevers with convulsions and deaf delirium, or rather with delirium and dulness. *Hippocrates* also relates in his book of

epidemics, several observations, which fully confirm the truth of his opinions, and the justice of his prognosis.

When the aphony is sympathetic, in that it is derived from a lesion at a distance from the larynx and throat, the treatment must therefore be studied by seeking to combat the morbid state which has produced it, and to discover the sympathies of the distant organs, which react upon the vocal apparatus. If, on the contrary, the alterations of the voice depend upon a pathological state of the speaking organs, properly so called, it is evident that the treatment must be subjected to the nature of the affection, and that resort must often be had either to medicine, or surgery, according to the circumstances which will be pointed out.

In mentioning the diagnosis peculiar to each sort of affection, I shall establish the means of cure proper to be employed, and the therapeutical agents which have most frequently succeeded in my own hands; taking care, also, to make known my failures, and to point out the danger of several empirical methods even now employed.

To render the study of the affections of the voice more easy, I have made a classification of them, in which I divide them into four kinds, ac-

cording as they constitute aphony, or produce only dysphony, which consists in a greater or less difficulty of emitting the vocal sounds.

*Synoptical Table of the Diseases and Organic Lesions,
which may cause Aphony and Dysphony.*

FIRST SPECIES.—Idiopathic cases of aphony and dysphony, arising from a physiological, anatomical, or traumatic lesion of the vocal organs.

These may be caused by the inflammations of the larynx, by those of the trachea, bronchi, isthmus of the fauces, tonsils, uvula, veil of the palate ; by laryngeal phthisis, œdema of the glottis, thickening of the pharyngo-laryngean mucous membrane, atony and paralysis of the muscles of the pharynx and larynx, spasm of these organs ; by falling down of the uvula, by its division with that of the veil of the palate and of the palatine bones ; finally, by wounds or contusions of the larynx and trachea, or an opening situated below the glottis ; finally, by the section or lesion of the laryngeal and pneumo-gastric nerves, etc., etc.

SECOND SPECIES.—Aphony and dysphony symptomatic of certain diseases which affect the whole economy.

These may be caused by adynamic fevers and

ataxic ; by some worm affections ; by pulmonary phthisis ; by aneurism of the aorta which then compresses the left recurrent nerve ; by lesions of the spinal marrow, excessive swelling of the stomach ; by apoplexy, hemiplegia, anemia, general weakness, convulsions, epilepsy, hysteria, catalepsy, chorea, insanity, cholera, frenzy ; acute moral affections, such as fear, anger, joy, etc. ; finally, by the abuse of ardent spirits, and the introduction into the economy of some poisonous or narcotic substances, etc.

THIRD SPECIES. — Sympathetic aphony and dysphony, depending upon the reaction which results from a pathological condition of certain organs more or less remote, and having no immediate relation with the vocal apparatus.

These may be caused by a falling down or an enlargement of the womb ; by the presence of a polypus in the cavity of this organ ; by ulcerations situated about its neck ; by the state of pregnancy ; by amenorrhea ; by dysmenorrhea ; the sudden suppression or the commencement of the menses ; by the swelling or inflammation of both testicles ; by chronic hepatitis ; a derangement of the system of the vena porta, or atony of the primæ viæ ; finally, by the suppression or diminution of a natural or artificial discharge, by perspi-

ration too long continued or suddenly stopped, especially about the feet and cutaneous surface.

FOURTH SPECIES. — Specific aphony and dysphony, resulting from a primitive or consecutive remote affection, which has been conveyed to the vocal organs.

These may be caused by the venereal, scrofula, scurvy, arthritis, rheumatism, gout, psoriasis, herpes ; by nearly all the exanthematous affections ; finally, by the ill-managed employment of the preparations of iodine and of mercury, which sometimes give rise to swellings and ulcerations of a peculiar nature.

As it does not enter into the plan of this work to treat of all the general or local affections mentioned in this synoptical table, I warn my readers that I shall content myself with simply examining the alterations and lesions of the organs producing the voice, taken collectively and separately. I shall therefore pass in silence over all the acute diseases, as well as all those general affections of the second class which affect the whole economy, and give birth to *symptomatic* aphony or dysphony.

CHAPTER VI.

CHRONIC SWELLING OF THE TONSILS.

AMONG the diseases of the organs which form a part of the isthmus of the throat, none is more frequent than hypertrophy of the tonsils. The chronic swelling of these glands arises from acute inflammations and irritations often renewed, which at length produce a permanent dilatation of their blood-vessels, and consequently a greater quantity of nutritive materials to these organs.

This swelling increases in proportion to the number of the inflammations of the isthmus of the throat. At first, it produces but a slight uneasiness in swallowing, and an immaterial alteration in the voice, especially in the acute sounds of the second scale; but it often happens that considerable swelling remains, and then constitutes hypertrophy of the tonsils, which may be carried to such a degree, that these glands touch the uvula, and so contract the isthmus of the throat, that the emission of sounds is almost im-

possible, and respiration becomes extremely difficult. The voice is rendered very hoarse and nasal, the pronunciation of words is changed and thickened, and persons laboring under this affection always speak as if their mouth was filled with food. Another inconvenience of no less magnitude is joined to those already pointed out. It is, that during deglutition, the food, especially liquids, are rejected through the nasal cavities, because the veil of the palate, disturbed in its functions by the tonsils, the volume of which is considerably augmented, cannot raise itself and completely close the posterior openings of the nasal sinuses. When the disease has reached this point it becomes necessary to adopt some remedy. We will now mention those which we have found to succeed in similar cases.

If the swelling was not of very long standing nor very considerable, as often takes place after a prolonged cold, the treatment might be conducted as in acute inflammations of the tonsils, and antiphlogistics should be employed, with revulsions and sudorifics taken hot, to which might be added, with advantage, some astringent gargles. If these measures do not completely succeed, there is another which rarely fails in its effect, and which promptly reduces the tonsils to

their normal state ; it is cauterisation with the nitrate of silver passed over the whole surface of these glands. This process, which I have very often employed with success, has also succeeded in the hands of my friend, *Dr. Carron Duvillards*, a young physician distinguished in medical practice and literature, and to whom science owes several important discoveries, especially in regard to the therapeutics of diseases of the eyes. If a liquid caustic be employed for the cauterisation, or a solution of the nitrate of silver conveyed to the organs by means of a hair-pencil or lint, care should be taken not to take up too much liquid, for fear that some drops might fall upon the healthy parts of the mouth or throat ; when the operation is ended, the patient should be made to gargle his mouth with barley-water sweetened with honey, in order to remove those parts of the caustic which may not have acted upon the diseased surfaces.

If the swelling of the tonsils depended upon a scrofulous diathesis, as I have seen it in several instances, then the antiphlogistic treatment would be more injurious than useful ; and previous to cauterisation the preparations of iodine might be successfully employed, such as frictions with the ointment of the hydriodate of potash upon the

superior and external part of the neck, corresponding to the external face of the tonsils; to these measures might be added, gargles made with one pint of distilled water holding in solution four grains of iodine; and it will also be of advantage to make use of baths of salt and water, or of soap-suds, or, better yet, of sea water. At the same time may be employed dry frictions upon the skin, with wool dipped into some alcoholic substance; to these measures may be added the iron mineral waters and bitter drinks of hops and gentian; finally, the treatment will be completed by the cauterisation with the nitrate of silver.

When the swelling is very considerable, and possesses the inconveniences which I have pointed out above, or when cauterisation and the other measures have been employed without effect, as in cases of less severity, the tonsils must be removed.

Finally, one thing must not be lost sight of in the treatment of chronic enlargement of the tonsils,—that to this affection are often joined a clammy state of the mouth and frequent disposition to vomit. Physicians, even the well-instructed, who have not observed these diseases, regard these phenomena as symptoms of an irritation of the stomach, which they think them-

selves frequently called upon to combat, while the phenomena observed by them are purely local. The clammy and fœtid state of the mouth depend upon an alteration in the mucosities of this organ, in consequence of a morbid secretion of the mucous membrane covering the tonsils, or from the irritation, which is propagated by continuity of tissue over the whole bucco-pharyngean mucous membrane. The disposition to vomit arises from the consecutive inflammation of the uvula, in consequence of the friction of this organ against the base of the tongue. This last phenomenon will disappear as soon as the tonsils have resumed their natural state, or been excised.

The tonsils are also subject to several affections which *always* more or less alter the voice. Thus there are sometimes formed in them kinds of calculi, the result of a thickening of the mucous matter and of the crystallization of the salts which enter into the chemical composition of the mucus; hence result concretions, which are sometimes tender and viscous, sometimes hard and crystalline, and of a yellowish color. The former are capable of being altered and of putrifying in the very body of the tonsil, which causes a most fœtid odor to exhale from the mouth, quite as

insupportable to the patient as to those about him. The concretions of the second kind, exclusively composed of the phosphate of lime, are non-putrescent like all the saline concretions. They sometimes distend the tonsils in an extraordinary manner, and dilate the depressions of these glands, so that their openings expand, and even permit them to be seen and touched with a pen, when the mouth is widely opened.

One of the symptoms, which indicates most certainly that the swelling of the tonsils is due to the presence of these calculi, is, that the individuals who are subject to them often spit out some fragments of these concretions, which are detached and fall into the throat. If deglutition is rendered irksome, and the voice is altered in singing and speaking, the only way to remedy these inconveniences would be to practise excision of the tonsils, as I have once done with success, and as was performed by M. *Blandin*, a short time since.

There are also developed in the tonsils, very rarely indeed, true *acephalocysts*, or vesicular worms, which occasion these glands to take on a considerable increase, and which is almost always confounded with their hypertrophy, properly so called. But in this instance the error of diagno-

sis has no inconvenience, especially if excision is performed ; for this operation is the only measure which can succeed, as I have seen it performed by M. *Dupuytren*. I will relate the case.

A young man presented himself for the opinion of this celebrated and skilful surgeon for an excessive enlargement of the tonsils, which altered his voice considerably, and greatly impeded deglutition. M. *Dupuytren* judged excision of the gland to be the best remedy, and the patient, possessing the utmost confidence in the skill of the operator, immediately requested him to perform it. During the incision, a quantity of moisture flowed out, and upon the part removed might have been perceived the half of a cyst, whose slight adhesion, elasticity and opaque color, left no doubt as to its nature. The remainder of this vesicular sac was extracted with the greatest facility, and the operation was followed by a complete cure.

The tonsils are also subject to some other diseases, such as cancer, which is incurable and happily very rare ; certain abscesses which are opened without resorting to art ; finally, ulcerations of various kinds, which require appropriate treatment, of which the size of this work does not permit us to speak, but which will be spoken of in treating of *specific* aphony.

CHAPTER VII.

ORGANIC PROLONGATION OF THE UVULA, AND PRO-LAPSUS OF THIS ORGAN.

THE uvula is a cone-shaped appendix, free and floating in the throat. Its apex is turned downwards towards the dorsal face of the tongue, and its base is united to the veil of the palate, of which it is a prolongation. The length and width of the uvula vary with the individual, and its two opposite faces present a line which is often quite deep. The structure of this appendage, which is slightly complicated, encloses a great number of mucous follicles; it is formed by the approximation of the two muscles, *azygos uvulae*, which are sometimes distinct, sometimes confounded as one muscle.

The uvula is covered on all sides by the *buccopharyngean* mucous membrane, and is formed of two lateral parts very distinct in young subjects, but united at a later period at the line. In some individuals, the two portions of the uvula remain

separated during life, in consequence of an accident in their formation, and this division is very often continued through the whole extent of the veil of the palate. The uvula also may not exist. Frequently no inconvenience results from it, but more generally speaking, singing in the acute notes and deglutition are executed with more or less difficulty.

There are few parts whose sensibility is more marked than that of the uvula ; when the summit of this organ is irritated by the contact of the tongue, or when it is excited by any lively irritation, the stomach is sympathetically excited, and nausea or even vomiting will result. For this reason, when it is desired to increase the action of an emetic, the finger is almost instinctively conveyed to this organ, which is likewise sometimes tickled for the same purpose with the feathers of a quill.

In consequence of its excessive sensibility, the uvula is subject to several diseases, and to frequent inflammations, which impart to it a degree of development, and often, also, a condition of prolapse which sometimes passes into the chronic stage, and which then constitutes a true hypertrophy of the glandular layer of this organ. At other times, this prolongation and morbid develop-

ment of the uvula depend upon a submucous œdema, which always yields to the action of the nitrate of silver.

The serous infiltration of the uvula is most frequent in the northern countries with a cold and moist climate, and it is usually observed in individuals of a lymphatic constitution, and those liable to catarrhal affections. It manifests itself sometimes suddenly, in consequence of cold drinks when the skin is covered with perspiration, or after a sudden chill of the entire body, or of the feet merely. A young lady of my acquaintance was attacked with an infiltration of the uvula after partaking of an ice at a ball, being very hot from dancing. Her uvula had in a short time acquired a considerable volume, so that it had lost its primitive form, and become rumpled, pale and semi-transparent. Cauterisations and astringent gargles soon reduced this organ to its normal condition, which, however, gave her no pain previous to the treatment, but merely incommoded her much in speaking, and excited a frequent disposition to cough and to vomit. In chronic inflammations of the uvula, the organ acquires a much smaller size, its color is much deeper than in the natural state, and it becomes the seat of a sensation of heat and of

smarting, which is propagated from the veil of the palate to the neighboring parts, and which may, in a great number of cases, cause a complete aphony, or, at least, a noticeable dyphony. In this case, antiphlogistics must first be employed; general bleeding, leeches in great numbers placed upon the verge of the anus, emollient injections, hot acidulated drinks, principally tamarind water; astringent gargles, especially those made with the sulphate of alum or of zinc; the application of a large blister to the nape; general baths, foot-baths with the addition of hydrochloric acid; issues on the posterior part of the neck. When this inflammatory state of the uvula appears to coincide with a suppression of the menses or of an haemorrhoidal flux, emenagogues may be employed with advantage, especially those containing the subcarbonate of iron. Aloetic purgatives, frictions upon the lower limbs may be resorted to; finally, every measure should be tried to combat the disease, whether by acting at once upon the diseased organs, or upon those of which the natural or artificial discharges have been suddenly suppressed.

Venereal ulcerations sometimes affect the uvula even to its destruction; in those cases where the presence of the venereal taint is well

established, to the general and local antisyphilitic treatment must be added cauterisations with the nitric acid upon the ulcerated surfaces, and the treatment may be terminated by the mineral astringent gargles.

In consequence of too long continued exertion of the vocal organs — as sometimes happens in certain professions, for example, among singers, orators, players upon wind instruments, public criers, etc. — the veil of the palate, and especially the uvula, fall into a state of atony, which occasions, in the latter, a relaxation and prolapsus, which may be followed by serious inconveniences; for, as M. *Lisfranc* observes, there may sometimes result a fatal laryngeal phthisis, or gastric and bronchial irritations, produced and kept up by the tickling of the throat by the free and floating extremity of the relaxed organ.

The fall of the uvula, merely from the disagreeable sensation which it produces by provoking, as we have already said, a constant desire to swallow and to vomit, would always be a great inconvenience; but, in addition, it seriously impedes, and even completely prevents the modulation and articulation of sounds in singing, and especially in speaking, as is observed by M. *Bennati*, when these acts are successive, as in

prolonged reading, parliamentary speaking, and in singing, which is thus rendered impossible. There may often result from it a complete and permanent aphony from the dry state of the throat, and the frequently repeated efforts made in speaking.

In this case, as in those already cited, recourse must promptly be had to cauterisation of the organ, and to astringent gargles. If, by this measure, a speedy change is not soon obtained for the better, and the contractile faculty of the muscle of the uvula is not sensibly augmented ; and if, above all, the individual is not a singer by profession, prompt recourse may be had to excision of the uvula, which is a speedy operation, attended with but little pain. The only inconvenience which can result from this operation, and that by no means constant, is that of permitting the nasal secretions to fall more easily into the throat, and of preventing, sometimes, as in excision of the tonsils, the formation of some acute notes of the *faucette*, or of the second scale. In individuals having a base voice, or simply a *laryngeal* voice of the middle scale, this latter inconvenience is less to be feared ; at any rate, it cannot be compared with those resulting from a prolapsus of the uvula.

In those who have a division of the veil of the palate, the uvula is always divided; it even sometimes happens that one of the halves of this organ is more developed than the other, and then the separation does not appear to be in the middle. When the division is limited to the uvula, and the individual experiences but slight inconvenience in the articulation and modulation of sounds, an operation should not be attempted. If the separation should, however, extend into the veil of the palate, as is sometimes the case, the inconveniences resulting from it are of so serious a nature as to require immediate surgical assistance by an operation named *staphyloraphy*.

CHAPTER VIII.

CHRONIC INFLAMMATIONS OF THE LARYNX AND TRACHEA, AND PRIMITIVE LARYNGEAL PHTHISIS.

THE larynx and bronchi, continually irritated by the contact of the air, and the injurious influences of heat, moisture, and cold, are, for this reason, more exposed than the other organs to acute and chronic inflammations. But from the nature of this work, we shall treat only of those chronic affections which alter the voice, and not of the acute, which are often soon fatal, such as certain inflammations of the larynx, croup, œdema of the glottis, which demand immediate relief, and which are rather diseases of the respiration than of the voice. We think it our duty to abstain from speaking of this latter class of diseases, on the one hand, that we may not wander from our subject, and, on the other, that we may extend our remarks upon chronic inflammations of the larynx, and upon primitive laryngeal phthisis, not coincident with any pulmonary

trouble. We shall, however, make a few rapid remarks upon the acute but slight inflammations of the bronchi and larynx, which merely produce hoarseness and a little cough.

These affections, united or separate, are neither more nor less than what is commonly called *a cold*, constituting a simple indisposition, which scarcely merits the name of sickness; which, therefore, does not in general attract the attention of physicians, or those affected by them.

The symptoms of a cold are a cough more or less severe, hardly painful, and the expectoration of some grayish spits, with some passing chills, which, with the other phenomena, occasion no trouble in the functions of the organs, and almost always permit those laboring under them to engage in their usual avocations.

If this slight affection is never disquieting, it nevertheless presents great inconveniences, especially to those whose condition obliges them either to speak or to sing in public, for it always produces hoarseness, and sometimes even complete aphony. It will therefore be useful to say some words upon the means of preventing it, and of curing it as soon as possible, the more so, inasmuch as it may easily increase in intensity, and occasion a chronic or acute laryngitis, unfortu-

nately too often beyond the resources of medicine. But as the causes of a cold, and the means of preventing it, are nearly the same with those of bronchitis and laryngitis, we shall reserve our remarks till after we have spoken of this latter class of affections, contenting ourselves, for the present, with pointing out the course to be followed in combatting a cold and hoarseness.

These slight shades of bronchitis and laryngitis are very frequently cured with the aid of simple hygienic precautions, the principal of which are the repose of the vocal organs, and the care to be taken in avoiding cold and moisture. To these measures, which alone are not always sufficient, may be added the use of cough mixtures, mucilaginous preparations, such as warm infusions of violets, of borage, or decoctions of dates, jujubes, figs, grapes, etc., sweetened with honey or sugar, or with syrups of gums, marsh-mallows, etc., or cut up in milk.

But a measure which almost always dissipates a cold, and which causes the hoarseness to disappear as if by magic, is to endeavor to excite a strong perspiration by the administration of diaphoretic drinks containing much gum, such as an infusion of borage-flowers, of elder, and of honeysuckle in equal parts, a handful of each to the

pint, with an ounce of gum Arabic, sweetened with honey or syrup. These drinks should be taken in the evening, some time after eating, and as hot as possible, so as to excite the perspiration as soon as possible, which will be still more favored by retiring to a bed well warmed, and abundantly furnished with coverings. I have obtained a great number of rapid cures by these diaphoretic infusions, the free use of which need not be feared. The effect of these hot drinks might be further augmented by the addition of one or two table spoonfuls of rum or brandy ; but this addition is only adapted to those who are in the habit of using these liquors, and would prove injurious to persons with irritable stomachs. In any case, these measures should only be employed at the commencement of slight colds, especially when it is desirable to put a speedy end to the hoarseness or aphony, and when the individual is from some circumstances obliged to speak or sing in public, and it cannot be postponed, as frequently happens to singers, comedians, lawyers, etc.

A milder, more uniform temperature, an absolute silence, a rigid diet, should be the first conditions to be fulfilled when the bronchitis invades in a more acute and intense manner ; that is, when it manifests itself by a strong fever, an

intense headache, full and frequent pulsations of the arteries, a violent and painful cough, a sensation of burning heat in the chest, chills on the surface of the body, a considerable oppression and dyspnœa, no expectoration, or the expulsion of some bloody spits. The conduct differs in this case from that for a slight bronchitis, and begins by the employment of blood-letting, cupping, the pectoral drinks we have already mentioned; to which may be added the loocho, doses of oil, very hot emollient poultices, often renewed, and applied upon the chest. If the cough were very painful and convulsive, the narcotics might be employed with advantage, which should be suspended as soon as expectoration became easier, and the spits were rendered more abundant.

If, after all, the bronchitis were prolonged, and threatened to pass into the chronic state, a large blister might be applied with advantage upon the chest, or, what has seemed to me preferable, friction might be made over the sternal region with the ointment of the tartrate of antimony, until large varioloid pustules were developed, which might be still further irritated by putting a piece of flannel upon them. Emollient vapors and emetics, recommended by several physi-

cians, have always appeared to us inefficacious, and even sometimes injurious.

When the acute bronchitis is prolonged beyond twenty or thirty days, without having been renewed by any anterior causes, and when the heat in the chest under the breast-bone and the resistance of the pulse have disappeared, good results are often obtained by the employment of aromatic and diaphoretic drinks; also, about the same period, local rubefacients and vesicants are applied upon the chest with the most advantage.

Chronic bronchitis ordinarily arises after repeated colds, or one or more attacks of acute and intense bronchitis; the treatment of this affection is based in part upon the same foundations as that of acute bronchitis. Bleedings, however, are rarely useful; for this reason, practitioners seldom resort to them when the affection is ancient. In this case, too gummy and mucilaginous drinks, with a feculent and milky diet, give place to decoctions of Iceland moss and ground ivy, the internal use of sulphur, of mercury in small doses and in pills, and balsams, with sulphuretted mineral waters. To these measures are added, especially among lymphatic persons, the moderate use of good old Bordeaux wine, and a diet principally composed of roast meats;

recourse may also be had to dry frictions and revulsives; it is advisable to wear flannel waist-coats, woollen socks, and to reside in the country, if possible in a chamber exposed to the south.

The symptoms of chronic bronchitis are reduced, in general, to the cough, expectoration, and an alteration in the voice, which varies as the inflammation of the mucous membrane is more or less prolonged in the direction of the larynx. Sometimes chronic bronchitis terminates in tracheal phthisis. This affection, although often beyond the resources of medicine, may continue for a long time, like laryngeal phthisis, without presenting any general appreciable symptoms; frequently, too, the general condition of the patients, by tranquillizing them as to their actual state, induces them to neglect their treatment, until they fall as it were of a sudden into a desperate condition. If we were not to speak of laryngitis, we would add several modes of treatment adopted for chronic bronchitis, but as the measures will be pointed out in the treatment of laryngitis, it will be useless to speak of them; we shall, therefore, content ourselves with a few words upon the causes of bronchitis in general.

Lymphatic, feeble, exsanguine individuals, who

have little vital heat, or who are constitutionally lymphatic, are more subject to attacks of bronchitis, and to *taking cold*, as it is commonly called, upon any exposure to the slightest, and often the most inappreciable causes. It is the same with individuals whom exaggerated precautions, resulting from an effeminate and bad education, have rendered too impressionable to the action of external agents. The convalescent, those who are weakened by considerable haemorrhage or a chronic disease still existing; lastly, those who have been frequently attacked by catarrhal inflammation, are more liable to contract all the species of bronchitis.

The most frequent causes of these affections of the bronchi are the impression of cold upon the whole body, or only upon certain parts, especially on the chest, shoulders, arms, feet, etc. The impression of cold is the more lively, and its action the more prompt, as the body is the more heated; for this reason, the inflammations of the bronchi are more frequent during spring and autumn, when they often reign epidemically, than during summer or winter, when the variations in the temperature of the atmosphere are less frequent and sudden.

These affections often also arise from the in-

fluence of the immediate contact of the cold air upon the bronchial mucous membrane, as well as the influence of that which has an elevated temperature, or which is charged with vapors or irritating gases, such as chlorine, ammonia, acetic acid, nitrous gas, etc. The inspiration of air holding in suspension particles of foreign bodies, such as dust, charcoal, plaster, lime, meal, etc., may also give rise to inflammations of the air-passages. But as *Laënnec* has observed, the inflammations which are caused by physical, chemical, or mechanical agents, are in general less severe and less rebellious than these same inflammations arising from the other causes mentioned. I have been called upon to treat many cases of chronic bronchitis, and cases of this kind are more frequent than is commonly supposed. The causes of these attacks of bronchitis were various; some arose from the too prolonged exercise of the vocal organs, as in singing, declamation, the forced cries of certain professions, etc.; others from various cutaneous eruptions, as small-pox, measles, scarlatina, the rash; to these may be added the hooping-cough. They are always preceded or followed by a more or less severe bronchitis, the invasion of which, as also that of the acute exanthematous diseases, is ordi-

narily preceded by uneasiness, chills, sneezing, loryza, soreness of the throat, etc.

Our intention in this work being only to treat of the affections of the vocal organs properly so called, especially of those of the throat, which alter the voice or entirely prevent the formation of the sounds, we shall here terminate what we have to say upon bronchitis, the causes, symptoms and treatment of which we have rapidly exposed with the view of rendering it more complete, because, as has already been said, chronic inflammations of the bronchi often produce aphonia or dysphonia, while there is no affection of the larynx, pharynx, or isthmus of the throat. If the voice were a simple vibration of the glottis, it would not be altered in bronchitis, although in this disease the larynx often experiences no alteration. The aphonia which arises in this latter case can then only be assigned to a new mode of vitality, which exerts its influence upon the glottis and the larynx.

If inflammations of the bronchi often produce a change in the voice, there are some cases in which this admirable organ always remains more or less unaffected; while the slightest inflammations of the larynx, especially those of the lips of the glottis, always produce more or less dysphonia.

As it is with regard to their *phonic* relation rather than their *respiratory*, that it is our intention to examine the diseases of the larynx, it will be best for us to pass over in silence all the acute alterations, which, in this respect, form more properly a part of the affections of the organs of respiration, than of those of the voice. We shall therefore say nothing about intense acute laryngitis, or about croupal and pseudomembranous laryngitis, which present such great dangers and are so often suddenly mortal, not from the nature of the disease, but from its situation. In fact, the larynx serving as a tube for the passage of the air, and this tube being considerably contracted by the approximation of the lips of the glottis, it would result that the slightest thickening of the mucous membrane, the merest layer of mucosity, or pseudomembranous concretions, might, by rendering the entrance of the air very difficult, bring on all the symptoms of asphyxia. I will content myself with saying that these species of acute laryngitis demand the most prompt and energetic measures; for the least delay in their administration is often the sole cause of their inefficacy. Large, general, and local bleedings should be immediately resorted to, derivatives of every kind should be employed,

emetics, also, and tracheotomy should be resorted to at an early rather than a late period, if the symptoms seem to grow worse rapidly. This latter operation has often failed because of too long delay before resorting to it. Chronic laryngitis may be consecutive to an acute laryngitis, but it more often begins in the chronic form after extreme fatigue and long-continued use of the organ of the voice, and is kept up by the repeated exercise of this organ required by certain professions. In some cases it is primitive, and entirely independent of pulmonary phthisis; it then takes the name of primitive laryngeal phthisis, to distinguish it from laryngeal phthisis consecutive to a pulmonary affection, of which it is a symptom, and therefore called symptomatic laryngeal phthisis.

Laryngeal phthisis may then exist alone, without coinciding with pulmonary phthisis; it may therefore be primitive. No doubt can remain with regard to this, when it is considered that a certain number have been cured, some cases of which I have seen. Moreover, in the autopsies of a few individuals, who have succumbed to a laryngeal phthisis, I have found pulmonary tubercles in their native or crude state, which could not certainly have exerted any influence

upon the course of the disease. I might here add another argument in favor of this opinion, that certain forms of phthisis called specific, such as laryngeal venereal phthisis, etc., are developed and run their courses independently of any pulmonary affection.

There is, then, no doubt but that laryngeal phthisis or ulcerating laryngitis may be developed suddenly, or be consecutive to a chronic laryngitis, very frequently coinciding with the general symptoms of a pulmonary phthisis, the principal of which are, hectic fever, night sweats, swelling of the legs, diarrhœa, etc., etc. ; the local symptoms of primitive laryngeal phthisis, etc., are, the alteration of the voice or complete aphony, a dry painful cough, often convulsive and accompanied by the vomiting of purulent or at least puriform matters. The cough increases by night, and the patient is often awakened by the suffocation he experiences. There is joined to a fœtid breath a great difficulty and a quick pain in swallowing the food, both liquid and solid ; deglutition is followed by violent attacks of coughing, and the unfortunate patients sometimes require to be nourished by means of an æsophagean tube. Such are the local and general symptoms of primitive laryngeal phthisis, and of

laryngeal phthisis consecutive to a pulmonary affection; as the latter always terminates in death, and as we are only concerned with the primitive and curable laryngeal phthisis, and with simple chronic laryngitis, which is also curable, we will content ourselves with speaking only of these two diseases which present a chance of cure.

As we have already pointed out the symptoms of curable and incurable chronic laryngitis, we will now expose those by which this simple and primitive disease manifests itself. At first the voice is very much altered, and its emission is always more or less painful and often impossible. The patients experience in the region of the larynx a sensation of uneasiness, accompanied with a dry cough, or followed by the expectoration of guttural mucosities which often bring with them the small tonsillary concretions we have mentioned. This condition may last a long time without presenting any general symptoms, and frequently the patients, deceived by an apparent condition of general health, neglect all the therapeutical measures prescribed them, and allow the disease to go on until it is beyond the reach of medicine.

Most of those attacked with this disease, fall

victims to it at the moment when they least expect it, because their death is still further accelerated by the œdema of the glottis or œdematous laryngitis, which is simply an acute inflammation of the submucous cellular tissue of the vocal cords. If such a fatal termination is the almost constant result of chronic laryngitis when it has reached an advanced stage, it is not so with this affection taken in season, and in a great many cases therapeutical agents may be opposed to it, the more efficacious if the disease is attacked at its very outset.

The diagnosis of primitive laryngeal phthisis is of the highest importance; the physician should especially examine with the utmost care by means of the stethoscope the condition of the lungs, and explore directly, by means of the sight and touch, all the parts constituting the isthmus of the throat; as, the uvula, veil of the palate, tonsils, columns, epiglottis, and even the superior opening of the larynx.

As these affections are often the sad result of too long exercise of the vocal organs, and as they have nearly the same causes which we have assigned to bronchitis, I shall, in order not to render myself tiresome by repetition, pass them over in silence, that I may the more readily arrive at the

most important part, which is the therapeutical. Although the treatment of chronic laryngitis and laryngeal phthisis has never been fixed upon in a positive manner, I will point out the principal measures which seem to me best adapted to combat these two affections.

An absolute silence should first be directed, and, in order to leave the affected organs as much as possible in repose, the patients should be requested to resist the disposition to cough as much as they can. It would be happy for them if they could in these cases suppress the cough as they can the speech, which can be supplied to a certain point by signs and writing.

Recourse may be had to flying blisters, moxas, small cauteries, and what has appeared to me preferable and from which I have obtained very good results, to frictions upon the sides of the larynx, with the ointment of the tartrate of antimony, till the pustules are formed. Small bleedings from the arm, to the amount of a quarter or half a porringer, the applications of leeches to the sides of the larynx, scarifying cups upon the nape or to the lateral parts of the neck, will act, at the same time, as derivative and antiphlogistic measures. Finally, the inspiration of the vapor of tar water, and especially of that of a

solution of creosote water, made with one scruple of creosote to four ounces of water, may be employed with advantage. This latter measure which I have employed with advantage, and which modifies and very quickly in some cases cicatrises over chronic ulcers of a bad character, requires to be employed a great number of times, and to be studied with the greatest attention, that positive conclusions may be drawn with regard to its efficacy in the treatment of ulcerating laryngitis. Such observations perhaps I shall have the advantage over every other person in making, from the care which I have taken to mark the effect of this new therapeutical agent in chronic diseases of the larynx. During the treatment of these guttural affections, the patients should be restricted to a soothing regimen composed of porridge, gelatinous broths, feculent or other articles of diet which should have as nearly as possible the consistence of pap, in order to render the deglutition easier and less painful; finally, the same measures may be pursued towards the patients as were pointed out in the treatment of chronic bronchitis.

When primitive ulcerating laryngitis resists the measures we have recorded, there yet remains another which we have never employed, but

which appears to have met with the greatest success in the hands of the Irish surgeon *Carmichael*. This measure which we should hesitate to adopt, regarding it as the only means of safety from a certain death, is tracheotomy performed in the manner recommended by this celebrated surgeon. As this operation is very important in its results, we deem it a duty to refer the reader to the original article in *The Dublin Medical and Surgical Journal*, for 1833.

CHAPTER IX.

SYMPATHETIC APHONY AND DYSPHONY.

The secret of the sympathies is evidently the same with that of the nervous action.

BEFORE speaking of the sympathetic vocal alterations, we will say a few words rapidly with regard to what is understood in medicine by sympathy, a word derived from the Greek *συν*, *with*; and *πάθος*, *disease* or *pain*.

In physiology and in therapeutics, the word sympathy expresses the relation of two or more organs more or less remote, which establish between them a kind of association, by means of which the vitality of the one is modified by the morbid or physiological condition of the others.

There exist, then, sympathetic bonds which impress vital modifications upon one or more remote organs, when an impression has been received by some other organ. These modifications not being shared by the intervening parts, cannot be referred to the mechanical connections, or to the ordinary

routine of the functions, but appear to depend upon a certain peculiar organization, which causes to vibrate in unison all the organs disposed so as to irradiate the impressions which they receive, whether directly by the anastomosis of the nerves, or indirectly by the intervention of the brain. But as the secret of the sympathies is still covered with a veil as thick as that which conceals the nervous action, we shall not attempt to render any explanation of it, desiring to content ourselves with speaking of the sympathies which produce aphony and dysphony.

All physiologists, ancient and modern, have noticed the sympathy which exists between the sexual organs and the larynx, not only during the healthy but also during the pathological condition of these organs. To this sympathy must be attributed the change in the voice, the faucette of the eunuch, the melodious singing of the birds in the season of their loves, the inconvenient spasm experienced by hysterical women in the throat; finally, the acerbity of the saliva of animals during connection and in the rutting season, which renders their bites at this period so dangerous.

It has also been shown by the observations of Dr. *Desgranges*, of Lyons, that the individuals

most addicted to the pleasures of love, are also the most liable to inflammations of the larynx, tonsils and throat. Besides, is it not known, that insanity in man is very often accompanied by a painful priapism, and that priapism in its turn may develop all the symptoms of insanity? I will here relate a curious fact told me by M. *Delpech*, while I attended the lectures of this distinguished professor.

A patient in the venereal hospital of Montpellier was suddenly attacked with a complete aphony succeeding a syphilitic swelling of the testicles; without attending to the loss of the voice, the venereal orchitis was treated in a rational manner, and the voice gradually returned as the swelling of the testicles disappeared. I had an opportunity to observe a similar fact three years since, the particulars of which were published at the time.

To the conclusive facts just mentioned, it may also be allowed me to add, that almost without exception all physicians know and have likewise observed the sympathy which exists in woman between the womb and the organ of the voice. Thus, during pregnancy, on the approach of the menses, during their flow or at their cessation, certain women, especially those of a nervous

temperament, experience more or less remarkable changes in the timbre and force of the voice. Facts of this kind are too numerous and too well known to require the citation of particular cases.

A sympathy in general less known and far less appreciated, although not less well established than those already mentioned, is the sympathy which exists between the larynx and the digestive and biliary functions. Thus, as I have found it in several instances, the voice may be altered by the want of action in the intestinal canal, by worms, by a derangement in the system of the vena porta. Aphony has also been known to arise from an acute or chronic inflammation of the liver, or from the abuse of injections or drastic purgatives; finally, the use of antiherpetic, antipsoric, antisyphilitic, and antiscrofulous ointments, which have often occasioned a complete aphony, proves the same as when it arises from the suppression or too long continuance of the perspiration, whether upon the feet or upon the whole surface of the body; all these facts prove the sympathies which exist between the vocal organs and the cutaneous system.

From the remarks upon sympathetic aphony it will readily be seen that, in order to combat this form, the physician must not seek to apply

therapeutical measures directly to the vocal organs, but must aim to discover the organs which react sympathetically, in order to struggle against the morbid or pathological condition which produces the reaction. Thus, the aphony caused by a prolapsus or an ulceration of the womb, would disappear in the one case by the application of a pessary, and in the other by the cauterisation of the neck of the womb. That occasioned by a suppression of the menses or a haemorrhoidal flux yields to the recall of these evacuations; in the former case, by means of local baths, bleedings, leeches to the vulva, aromatic vapors, chalybeate preparations, and all the exciting emmenagogues; in the second, by means of leeches to the arms and aloetic purgatives, etc.

It is the same with every sympathetic aphony, the treatment of which should be modified by the practitioner according to circumstances; his own experience and medical sagacity should supply all that it would be useless and too lengthy to detail in this place, for the therapeutics of the sympathetic vocal alterations will necessarily present variations, depending upon the transitory or permanent nature and action of the causes, which may have reacted sympathetically. It is therefore necessary to seek out these causes, and to

examine them scrupulously: upon a knowledge of them almost always depends the cure. We will only add, that while the physician is engaged in treating the organs which have occasioned the sympathy, he must not lose sight of the vocal organs, but should the more attentively observe them because the efficacy of the general measures which he has employed may often be increased, if the treatment is completed by astrin- gent gargles of the sulphate of alum, made in the proportion of one part of this salt to sixty parts of distilled rose-water.

In the expectation that, by a more attentive observation of our economy, more certain ideas will be gained upon the different relations and all the sympathetic connections of the organs of the voice, it seems sufficient to point out the principal without seeking to explain the physiological mys- tery which gives them birth, or to discover the vital laws in virtue of which they manifest them- selves.

CHAPTER X.

SPECIFIC APHONY AND DYSPHONY.

“ He who knows can also cure.”

HIPPocrates.

BEFORE speaking of the treatment of the specific lesions of the voice, I shall say a few words as to my meaning of the term specific aphony. In my opinion, the term *specific*, when applied to diseases in general, indicates those which are developed in consequence of a special vice, *sui generis*, which fixes itself primitively or consecutively upon one organ in particular. From this definition of the word specific, pathologically speaking, will easily be comprehended the afflictions which I would designate as specific aphony and dysphony.

Thus the venereal, scrofulous taints, and all the chronic eruptive diseases, which it is useless to name, may, by a displacement of their morbid agent, be transferred to some organ in particular, or without quitting the seat of their devastations,

may extend more particularly upon certain parts, which, in the majority of cases, escape. A specific aphony is, then, that condition, in which a particular morbid taint, losing in some sort the type which ordinarily characterises it, carries its ravages against the vocal organs, and prevents them, by its unhappy influence, from performing the admirable part which nature has assigned to them.

It is thus that the syphilitic virus, which ordinarily is circumscribed and fixes itself in preference upon the genital organs, with which it is brought in contact, may attack the vocal organs, and occasion aphony or dysphony, either by changing their mode of vitality, or by destroying some of their parts. This accursed devastator, engendered by vice and corruption, may, unfortunately, in some cases, attack innocence and virtue. A case occurs to me of a young man, who contracted a laryngitis, and had afterwards venereal aphony, for having played on the horn with the mouthpiece of his master, who was laboring under this disease. A mercurial treatment, by my direction, soon caused this primitive affection to disappear, which, although there were no traces of ulcerations apparent, yet occasioned

a very lively sensation of heat in the throat, and also a complete extinction of the voice.

There may, then, exist a venereal aphony; and, if the experience of every day did not forbid the existence of this affection to be doubted, I might bring forward a great number of cases capable of removing all uncertainty in regard to it. I have also had an opportunity of treating, by mercury and sudorifics, and thus perfectly curing, an old soldier, thirty-four years of age, reduced by a syphilitic laryngeal phthisis to the last degree of marasmus, with continued hectic-fever and night-sweats. No one had ever before suspected a venereal cause for this affection, which would soon have proved mortal, if the confessions of the patient, and a slight tonsillary ulceration of a suspicious nature had not put me upon the real traces of the origin of this disease.

Venereal laryngeal phthisis is very easily recognised, when the disease has commenced on the genital organs, or when it is manifested by other symptoms as plain, such as exostoses, caries, glandular enlargements, etc. ; in this case, the physician pronounces with certainty. But if the syphilitic taint commences its ravages at the very first upon the larynx and the other vocal organs, difficult or impossible to be explored, the

diagnosis then requires a very skilful and experienced practitioner. In this case, he must interrogate the patient, with the view of profiting by his confessions, and examine, with the most scrupulous attention, the tonsils, mouth, tongue, veil of the palate, in short, all the vocal organs in sight; particular attention should be given to the pustules and chancres, the ulcerated surface of which is of dirty white, with the edges thickened, hardened, ragged and perpendicular. The gums should be carefully examined to see if they are spongy, and with red and inflamed borders. An examination must also be made to ascertain, if the glands are not the seats of indurations and suspicious spots; in short, if there cannot be found on them transparent pustules, covered with scaly crusts, etc.; if all these symptoms are joined to those which we have already pointed out as the means of recognising primitive laryngeal phthisis, the physician may pronounce with certainty, that the aphony he is called upon to treat is of venereal origin.

It often happens, that the veil of the palate, uvula, tonsils, and all parts of the isthmus of the throat are equally the seat of ulcerations of a syphilitic nature, although there may not be any affection of the larynx or trachea; there is, then,

only dysphony, especially in the acute sounds of the faucette, and the patients speak as if they had a division of the uvula, or an enlargement of the tonsils. I have observed in the venereal hospitals, that all those who presented ulcerations on the veil of the palate, even without perforations, had only a dysphony in the articulated speech and singing of the first scale, while frequently, in the same individuals, might be remarked a relative aphony ; that is, an aphony which took place only in some of the high notes of the second scale. This observation also militates in favor of my theory upon the mechanism and formation of the acute sounds of the faucette.

The venereal taint may also attach itself to the bronchial glands, and extend over the whole mucous membrane of the trachea, so as to give rise to a venereal bronchial phthisis, from which frequently results dysphony, and sometimes even complete aphony. In this latter case, and in the others we have mentioned, the practitioner should promptly resort to the therapeutical agents, which the experience of several centuries, and the testimony of the best physicians, have presented as best specifics to neutralize the action of the disease, and arrest the ravages which mark its presence.

Let, then, ignorant and unfaithful men attack the mercurial preparations, as quacks are allowed to employ their puffs, or to defile the walls and newspapers to cry up other remedies; in spite of the various and often opposite opinions, which have been put forth in favor or against mercury, the preparations of this metal present to us the surest guarantee of our desires. I will not stop to describe the different modes of administering mercury, whether by frictions on the endermic method, or internally; but I will merely add, that the bi-chloride, (corrosive sublimate,) taken in the form of a pill, and combined with the gum guiacum and the gummy extract of opium, has appeared to me the mode of administration which, on the one hand, least fatigues the patient, and, on the other, presents more frequently and more constantly happy results. Each pill, as I employ them, is composed in the following proportions, from the formula of *Professor Dupuytren*:

Gum Guiac,.....	2 grains.
Gummy Extract of Opium,.....	1-3 of a grain.
Bi-chloride of Mercury,.....	1-6 of a grain.

Of which one, night and morning, may be employed at first, afterwards two, increasing one at each time, every fifth day; but the number should never exceed four, twice a day, till the

treatment is completed. During the use of these pills, gargles may be employed of barley-water, sweetened with poppy-syrup, to which may be added two teaspoons of the liquor hydrargyri bi-chloridi to a tumbler of the liquid; but the addition should only be made at the moment of using it, to avoid the decomposition of the mercurial salt. Finally, to these measures may be joined a ptisan of sarsaparilla or guiacum, and a mild regimen, in strict accordance with the rules of hygiene. Even when a syphilitic cause is plainly recognised, the employment of the mercurial preparations must not be resorted to without reserve; their use demands much prudence, and commands the strictest precautions; for often have patients hastened their death by an ill-judged treatment, when they thought to escape it. In the cases aggravated by the use of mercury, the ptisan of feltz may be tried with advantage, the sudorific syrups and ptisans of guiacum and sarsaparilla.

CHAPTER XI.

SCROFULOUS APHONY AND DYSPHONY.

THERE may likewise exist a scrofulous aphony, or, at least, a dysphony, requiring a particular kind of treatment, which we shall rapidly explain, after having said a few words upon the general and local symptoms which indicate the vocal alterations of this nature.

We mean by scrofulous aphony, that which is caused by a lesion residing in the vocal organs, and developed in consequence of a scrofulous taint. Among the affections of this class, which may cause alterations in the voice less rarely than is generally supposed, are found induration and hypertrophy of the tonsils, glandular mucous inflammation of the larynx and bronchi; finally, certain chronic discharges of the bronchi and trachea, and, frequently, the thickening of the mucous membrane of all the vocal organs.

Being desirous to avoid any interruption of the plan originally proposed, I shall not undertake in

this place to speak of the nature, causes, and varieties of scrofulous diseases; neither shall I attempt to indicate all the denominations, by which nosographists have designated all the affections of this species; I suppose the reader is acquainted with their signification. Moreover, as I had nothing to add to what I have found in all the medical treatises, I have thought it best to pass by this subject, and to content myself with speaking only of the diagnosis and treatment of scrofulous aphony.

The diagnosis of the vocal affections of this nature is in general very difficult; and if the physician succeeds in establishing their presence, in a manner sufficiently positive to permit him to act with certainty and confidence, it can only be by frequent practice and the most scrupulous examination.

To render our remarks upon scrofulous aphony more in order, we will point out the symptoms which aid in distinguishing it from those having a different cause. We divide these symptoms into two classes; the first are furnished by the external appearance of the patient and the state of the functions in general; the second, by the exploration of the vocal organs and the origin of the disease.

The scrofulous constitution is manifested externally by the appearance of a very delicate skin, transparent and clear, of a dull white, and sprinkled with freckles, especially on the face; the limbs are cold, small and weak; the joints large, the flesh soft and flaccid; the form rounded and of little elegance; the cellular tissue, by its great development, effaces the prominence of the muscles; the face is full, the features are delicate; and almost always a rosy color upon the cheeks forms an agreeable contrast with the whiteness of the complexion, and gives an appearance of health, which deceives people in general, but never the observant practitioner. The eyes are in general large, widely opened and sensible to the light; the look expresses mildness and tenderness, and the expression of the face almost always bears the impression of sadness and melancholy; the wings of the nose are swollen, the nostrils red, shining, often excoriated internally; the lining membrane is often irritated, and grows thicker and thicker; the mucous membrane of the pharynx is sometimes the seat of the same lesions, which affect the voice and render it harsh and nasal; the lips are swollen, especially the superior; the gums are soft, the lower jaw is greatly developed in the transverse direction; the

hair is fine, light, sometimes red, seldom black. The neck is rounded, the lymphatic ganglions in general, especially those of the jaw and cervical regions, are usually hard, round, and roll under the fingers. Such, in a few words, are the principal symptoms furnished by the physical condition of the patients.

We shall now present the symptoms, which are furnished by the condition of the functions. In persons afflicted with a scrofulous constitution, the digestive functions are often painful and irregular; the absorbent functions seem, on the contrary, to increase; the secretions are inactive, especially the cutaneous perspiration; respiration is performed in a painful manner, and the voice, even when the organs which produce or modify it, are not particularly affected, is almost always more or less hoarse or shrill. I am far from thinking, that those who labor under a scrofulous taint will present all the characters I have mentioned. It is enough to recognise a certain number of them; and, if I have mentioned them at some length, it is, that my readers may not lose sight of them in the diagnosis, frequently uncertain, of scrofulous aphony and dysphony.

The organization of individuals merely predisposed to the disease in question, presents, as has

been shown, characters, in which the physician cannot be mistaken, although it only manifests itself under the appearance of freshness and health. This organization, then, may be modified by many circumstances, and often the unhappy effects which are developed under the influence of this cause, at first exert their destructive influence only upon certain organs, to attack subsequently the whole economy, and to carry ravage and trouble to all the functions.

If the scrofulous condition have invaded the whole organization, it may in some cases develop only local affections, which authors have described as being the principal disease, while they are but irritations and inflammations in consequence of the scrofulous condition. These irritations are developed in different parts, and vary with the nature of the tissues, in which the lesions manifest themselves. Most practitioners not having made this important distinction, do not perceive the scrofulous disease till there are present swellings in the throat, caries, etc., etc. The result has been, that no effort has been made to combat the disease, until it has been allowed to invade the entire organization, and has exercised great ravages in the whole animal economy. The object, then, should be less to combat the

symptoms of the local affections, which are but secondary, than to attack the causes and origin of the disease.

Thus, when an individual affected with an alteration in the voice presents most of the characteristics indicating a scrofulous condition, he should be examined with the greatest attention, to ascertain, as far as possible, if his affection does not depend on one of the causes already mentioned, or which will be made known in another chapter. If, for example, the tonsils are hypertrophied without being the seat of pain; and if the swelling is old, and not the result of several successive acute inflammations; finally, if it presents upon its surface small projections or patches of a violet red, which are almost always indolent; in this case the physician may pronounce with certainty, that the alteration of the voice is caused by a scrofulous affection. The diagnosis will be corroborated, if the mucous membrane of the pharynx has a livid and marbled aspect, and if the patient, without experiencing any heat and almost no pain in the pharynx and bronchi, joins to it a mucous discharge, so abundant and fetid as to cause him to expectorate frequently. This discharge is the result of the local scrofulous irritation of the mucous membrane lining all the

vocal organs; it constitutes an actual strumous bronchorrea, which may even lead to pulmonary phthisis. In some cases, on the contrary, in the place of this bronchial discharge the mucous membrane becomes dried and thickened, so that by a change of vitality it gives rise to a complete aphony, which is often beyond the resources of art.

To combat the aphony arising from the lesions mentioned, great care must be taken to avoid the antiphlogistic treatment, especially as regards general bleedings, which would be dangerous, and always aggravate the disease. The antiscrofulous remedies should first be employed, particularly iodine taken in its different forms; at a later period the baths of soap and water will be prescribed, or, better yet, of salt and water, or of sea-water, combining them with solutions of gelatine; ioduretted gargles may be advised, or of the iodide of zinc, which are at the same time antiscrofulous and astringent. These gargles should be prepared according to the formula given hereafter. At the end of the treatment, these measures may be supplied by gargles of alum, which should be continued for some time, and frequently renewed. Finally, to add to the efficacy of the treatment, tonics may be pre-

scribed, such as the extracts of gentian, bark and centaury, the preparations of iron, ptisans of hops, the juices of the cruciferous herbs mingled with those of the bitter plants, the Lisbon diet drink, the resinous excitants, such as tar, tincture of bark, etc. Frictions of the hydriodate of potass may also be employed upon the anterior and lateral parts of the neck, dry frictions of the skin; and care should be taken to alternate the different kinds of tonics and excitants with each other, to prevent the patients from becoming habituated to the action of the same substances, which would thus soon lose their effect. If any particular accidents or general symptoms should arise in the course of the treatment, every thing must be suspended, and even antiphlogistic measures, or any others indicated, be resorted to, exactly as would be employed if the patient were not affected with scrofula.

The kind of diet which agrees best is the most substantial and tonic. Boiled or roast meats, eggs, claret wine, should constitute the basis of the nourishment: to these may be added, however, with advantage, the moderate use of salads, of the farinaceous greens, and very ripe fruits. In short, the physician will vary the treatment at pleasure and according to circumstances, provided

he does not forget that it is not the aphony which he should seek directly to combat, but rather the scrofulous condition, which is the first cause of it.

There yet remains for me, before finishing this chapter, to speak of aphony from chronic eruptive diseases or scurvies, which are developed either by metastasis, or sympathetically. But as on the one hand these vocal affections are very rare, and as their treatment requires to be conducted in the same manner as that of other cases of specific and sympathetic aphony, I shall content myself with speaking of them briefly, and add, that the chief object of the physician should be to endeavor, either to combat directly the specific vice, which is the origin of the disease, or first to recall the morbid agent to the parts which it has abandoned, to attack it afterwards by all the measures presented by therapeutics, as proper to arrest its course and completely eradicate it.

CHRONIC EXANTHEMATOUS APHONY AND DYSRHYTHMY.

The word exanthem was employed by the ancients and also by the moderns, to designate every kind of acute or chronic eruption of the skin. An exanthematous aphony is, then, that which results, either from the transition or exten-

sion of an exanthem, or from its sympathetic reaction upon the vocal organs.

I shall not stop to explain these transitions, extensions, or sympathetic reactions, neither can I attempt to point out the treatment adapted to each species of exanthematous aphonia; such a course would be wearisome from its length, without presenting any advantages. I shall, therefore, content myself with saying, that the first principle in the treatment of this kind of disease of the voice consists in producing the reappearance of the cutaneous eruption, by recalling the symptoms of tetter or psoriasis, etc.; after which, all the vocal accidents will disappear, and the specific voice may be combatted by the measures which experience has proved to be the most efficacious. If the disease should be neither the result of a metastasis nor of a sympathy, but rather of an extension of the disease, it should be combatted directly and by a local irritation of the skin, to endeavor to free as soon as possible the vocal organs from the irritation seated in them. To attain this object, blisters may be employed in the cervical regions, hot sudorific drinks sweetened with honey and acidulated with a few drops of the acetate of ammonia, friction of the skin, and baths of soap and water; baths of sulphur may afterwards be resort-

ed to, and the other measures too well known to require that I should point them out in this place.

CHRONIC SCORBUTIC APHONY AND DYSPHONY.

This species of aphony, very rare, and almost always incomplete, is the result of a chronic scorbutic affection which has been badly treated, and not completely cured. The patients, who are attacked with an alteration of the voice depending upon this vice, without presenting all the ordinary symptoms of scurvy, are, nevertheless, easily recognised ; first, because they never fail to speak of their old disease, and again, because they usually present the following lesions :

On inspection of the vocal organs, the tongue, the veil of the palate, and the sides of the mouth, are often found more or less tumid, and of a deep, almost livid color ; the cheeks are also swollen, and bleed upon the slightest friction ; lastly, the laryngo-pharyngean mucous membrane is often covered with ulcerations and aphthæ, which prevent the ready motions of the pharynx, and, by changing the mode of vitality of the mucous membrane, necessarily produce dysphony and even aphony. In addition to these, are the paleness and tumidity of the patients,

their weakness, and the infected odor of the breath.

The treatment, which is that of scurvy, consists in taking aromatic baths, in making use of acidulated drinks, of decoctions composed of gentian, wild chicory, hoarhound, fumitory, elecampane, etc., with the addition of some grains of the carbonate of soda, the tinctures of bark, decoctions of tan, and especially of the following gargle :

Decoction of Oak Bark,.....	1 pound.
Distilled Rose-water,.....	4 ounces.
Sulphate of Alum,.....	2 drachms.

The decoction of oak bark is made in the proportion of an ounce of bark to a quart of water. This gargle may be sweetened with syrup of raspberries, gooseberries, lemon or orange flowers. The diet should be composed of roast mutton and beef, red fruits, claret wine, goat's milk, etc. Promenades, diversions, and change of air, will materially aid the good effect of these measures.

I might also speak in this chapter of certain vocal lesions, which may be developed under the influence of the gout and rheumatism; but as the existence of these species of aphony is not sufficiently well-established, I can only point

them out, to warn the practitioners who may have an opportunity of observing them, that they must endeavor to recall the disease to its first place of selection by means of frictions, epispastics, cupping, moxas, warm baths, sudorific drinks, etc. It is useless to add, that all these therapeutical measures should always be subjected to the type of the disease, and made to depend upon the circumstances and symptoms which are observed.

CHAPTER XII.

APHONY AND DYSPHONY SYMPTOMATIC OF OTHER PARTICULAR AFFECTIONS.

In cunctis certas inquirere causas difficile est !

FRASCATOR, LIB. I.

IF, in most cases, aphony or dysphony result from a pathological condition of the vocal organs, taken as a whole or in part, these alterations of the voice are also, as we have already said, symptomatic of certain affections, and cannot then be studied by themselves in a practical relation ; that is to say, independently of the morbid condition which has produced them. As the affections, which may occasion greater or less alteration in the emission of the vocal sounds, are as various as they are numerous, I will restrict myself, in this chapter, to speak of those which are the most frequent, and which I have myself most often observed.

ATONIC APHONY AND DYSPHONY.

I mean, by atonic aphony or dysphony, that which depends upon one of the following causes:

1. Upon atony, or want of power in the organs producing or modifying the voice.
2. Upon atony of the primæ viæ.
3. Upon general chlorotic atony.

The aphony which is caused by atony of the organs modifying or producing the voice, is characterized by the absence of cough, the pale color of the pharyngean mucous membrane, joined to the difficult play of the superior constrictor muscles of the pharynx, of the muscles of the uvula, of the tongue, etc. In this case, if the disease seems entirely local, and not to depend upon one of the causes which have already been, or will hereafter be pointed out; if the movements of the throat are merely difficult, without being painful; if the patient enjoys, in other respects, good health, the physician may rest assured that he has a local atonic aphony to combat. This vocal alteration is one of the most frequent; it is often caused by the prolonged exertion of the vocal organs in singing, declamation, and even ordinary speech. Thus it is very frequently observed in lyric and dramatic artists, orators, persons of any profession requiring great display

of the voice. This aphony is often intermittent, and liable to reappear after any vocal exertion whatsoever, and frequently, too, without any appreciable causes. An artist of the Théâtre-Français, as distinguished for her wit as for her talent, Madam Talma, now Countess of Chalot, whose physician I have the honor to be, was obliged to quit the stage, where her career was so brilliant, because she was attacked with an aphony of this kind. I might cite a great number of instances of this kind of affection, which were caused by the abuse of certain tepid infusions, of cough drops or pills, too frequent bathing, local or general bleedings, which are always contraindicated, and which increase the disease, even to rendering it sometimes incurable.

To meet this kind of alteration of the voice, which is often only a dysphony, I employ the following measures :

1. Gargles, at least three times a day, according to the following formula :

Sulphate of Alum in powder,.....	1 drachm.
Honey of Roses,.....	1 ounce.
Filtrated decoction of Peruvian Bark,.....	8 ounces.
Infusion of Roses,.....	6 ounces.
Distilled Rose-water,.....	1 ounce.

Subsequently, I increase the dose of alum, which may be gradually carried, according to the

circumstances, as high as six or eight drachms. M. *Bennati*, who has employed this substance with great advantage, says he has even used it of the strength of two ounces in ten of the decoction of barley-water; his formula will be given hereafter. To the use of the gargles I add frictions, every morning and evening, upon the anterior and lateral parts of the neck, with the following:

Extract of Henbane,.....	6 grains.
“ of Belladonna,.....	6 grains.
Balm of Gilead,.....	4 ounces.

If the atonic aphony seems to be complicated by a slight paralysis of the laryngean nerves, I substitute the following liniment for the preceding:

Alcoholic Extract of Nux Vomica,.....	6 grains.
Liquid Ammonia,.....	1 drachm.
Camphorated Alcohol,.....	2 ounces.
Oil of Sweet Almonds,.....	2 ounces.

When the local aphony is nearly dissipated, and the voice has resumed its natural timbre, I advise the moderate exercise of the vocal organs, either in singing or in declamation. If the patient is a singer, he should not attempt lengthy pieces of music, but only to exercise upon the gamuts, at first in the medium voice, then in the base notes and the fauette, according to his vocal

organization. If the individual does not sing, he should read and speak in a loud voice without making any effort, and attempting to imitate the declamation of the recitatives, or to produce sounds approximating as much as possible the gamut in singing. This exercise, which should always be moderate and gradually taken, has for its object to strengthen the vocal organs, as slight exercise reestablishes the exhausted forces of a convalescent after a long disease.

If the aphony is complicated with an atony of the primæ viæ, or a gastric embarrassment, the physician will have recourse first, either to emetics, or purgatives, to be afterwards followed by tonics, such as the preparations of Peruvian bark, iron, bitter drinks, etc., etc., the mineral waters. If the aphony depends upon a general chlorotic atony, to the measures already indicated will be added the bitter aromatic infusions, such as those of mothwort, saffron, sage, balm, etc.; afterwards may be employed with advantage the more active tonic emmenagogues, as horse-chestnut bark, gentian, bitter quassia; the tinctures of cinchona, centaury, wormwood, may also be used with advantage. He will then resort to the chalybeate wines and other ferruginous prepara-

tions, such as iron-filings, the sulphate of the same metal, and the natural mineral waters.

To bring back the menses, if they have not reappeared, the treatment should be conducted as we have mentioned in sympathetic aphony ; the physician will employ stimulating injections, aromatic fumigations of the sexual parts, irritating fomentations on the hypogastric region, sinapisms, stimulating foot-baths, cupping, hot drinks, etc., etc. Finally, every eight days the application of two or three leeches should be made to the vulva, less with the intention of diminishing the quantity of blood than of directing it towards the uterus.

Individuals laboring under one of the atonic alterations, of which we have exposed the principal characters, should all first have recourse to the gargle, the formula of which has already been given. They should also strictly observe all the rules of hygiene, both in nourishment and drinks, and in clothing themselves suitably to the season. They should avoid sudden transitions from hot to cold, and should make frequent use of tepid bathing, in order to favor all the secretions and eutaneous perspiration, which should, however, always be moderate.

APHONY AND DYSPHONY FROM WORMS.

I understand by worm-aphony that which is produced by the presence of worms in the digestive tube. Persons attacked with this species of aphony exhibit certain symptoms known to all physicians, but which it will, perhaps, notwithstanding, be useful briefly to run over, because, by not losing sight of them, the cause of the alteration or extinction of the voice is easily discovered.

Patients experience disgust towards certain articles of food, and frequently have an excessive hunger returning at intervals ; they are generally tormented by frequent hiccough, nausea, eructations of acid gas, and by a fatiguing salivation. They have rumblings in the bowels, colics, together with diarrhoea or tenesmus ; the abdomen is clammy without marked pain ; if they are still young, they have dilated pupils ; they are tormented by buzzing in the ears, and great itching of the wings of the nose. Their eyes are surrounded by a dark ring, the countenance is livid, and often a slight dry cough is added to the other symptoms ; finally, as *Rosen* justly observes, they are relieved by the passage of some worms or some portions of them, which last sign is the only

positive evidence of the presence of these animals.

To combat this worm-aphony the effort must be made to put an end to the cause producing it, by the use of purgatives, especially by castor-oil combined with the anthelminthic substances, as the chenopodium, the worm-seed; finally, the treatment should be terminated by tonics, such as the preparations of iron and Peruvian bark; after which the astringent gargles with the sulphate of alum or of zinc may be employed.

NERVOUS APHONY AND DYSPHONY.

Nervous aphony is the result either of some affection of the brain or pneumo-gastric nerves, or of an affection of the nerves peculiar to the larynx. This kind of aphony may also be caused by the use of alcoholic drinks, or the introduction into the economy of certain narcotic substances. *Sauvage* relates the curious case of some robbers, who rendered the persons they wished to rob mute from aphony, by compelling them to drink wine into which had been infused some grains of stramonium.

Like all the functions which depend immediately upon the nervous system, the vocal

functions may experience various alterations from the slightest causes. Thus the nervous action, which presides over the motions of the larynx and glottis, may be suspended by many causes and particular circumstances, such as a sudden passion, anger, fear, the approach of an imminent danger, a fall, any sudden movement whatever. This last kind of aphony is usually of short duration. If the contrary should be the case, the same measures will be pursued as in the cases of aphony already mentioned, excitants of various kinds, such as frictions upon the anterior part of the neck with irritating liniments, blisters, moxas, cupping, setons in the neighborhood of the larynx; lastly, electricity offers yet another resource from which good results may, in some cases, be obtained.

There is also a kind of aphony or rather of nervous dysphony, which is characterized by a sort of barking produced by a convulsive condition of this larynx. This species of dysphony which I have had an opportunity of seeing carried to a very great degree, yields almost always as if by magic to the well-directed employment of antispasmodics, especially to valerian tea and assafœtida pills. I might also introduce a case peculiar to myself, where, in addition to the

measures indicated, I made use of small moxas in the parts bordering on the larynx ; but I prefer to relate the following, which I observed in Hotel-Dieu, and which has likewise been narrated in the excellent thesis of my friend, Dr. Junot, of Yverdon.

The patient who is the subject of this observation, is a young child, ten years of age, lying No. 63 in the hall St. Martha, who entered the Hotel-Dieu in the month of March. This little fellow was of a delicate constitution, and lymphatic temperament. He assigned the origin of his disease to a period six months preceding, but could give us no other details than the following : He related, that being suddenly taken with nausea and a desire to vomit, he remained affected with a sort of spasmodic convulsion of the larynx. At first he experienced only a slight difficulty in speaking, but soon the articulation of sounds became entirely impossible. The only treatment adopted by his physician was, to oblige him to take a decoction of grapes and of prunes ; but, as might have been supposed, the disease, far from amending, continued to grow worse. In this melancholy condition, the parents of the child brought him to the Hotel-Dieu, at Paris.

The disease appeared to consist principally in

an alteration of the vital properties of the internal and external muscles of the larynx, which ceased to be under the influence of the will. The movements of this organ were great and hurried, to such a degree that it traversed the space of an inch, namely, half an inch in ascending and as much in descending; these motions were executed with such rapidity, that the eye could scarcely follow them. From this cause the vocal canal was suddenly lengthened and contracted, and the irregularity of the spasmodic contraction and relaxation of the laryngeal muscles, especially of those intended to stretch the lips of the glottis, gave rise to sounds more or less acute and strong. The voice of this child was then modified in a vicious manner, closely approximating that of an animal, and might be compared to the barking of a dog.

The treatment consisted in the use of an infusion of valerian, and the administration of pills of assafctida. The cure was perfected in a few days, and the child was sent back to his parents having perfectly recovered the use of his speech.

RELATIVE APHONY AND DYSPHONY.

I designate by the name of relative aphony or dysphony, that which takes place only upon cer-

tain vocal sounds in the articulated or modulated voice ; for example, there may be an aphony in the articulation of a labial sound, although a lingual sound may be produced in all its integrity. Thus persons are often met with who cannot articulate *ba*, *ma*, *pa*, *fa*, *va*, and who can yet readily pronounce *la*, *sa*, *ra*, *da* ; and *vice versa* for all the syllables and all the sounds. It is the same with the voice modulated in singing ; thus there is often an aphony for the sounds of the faucette, while beautiful sounds may be poured forth for the base and medium notes. A perforation of the palate, ulcerations upon this organ or in the isthmus of the throat, a falling down of the uvula, etc., may, according to our ideas of the formation of acute sounds, produce the relative aphony we have mentioned. These different vocal alterations, which are so often most improperly confounded with stuttering, may be put to a distance. In other terms, there may exist as many kinds of aphony of this class as there are vocal sounds taken separately, or in combination with consonants. From this it is manifest, that the voice has no special and exclusive organ, but an apparatus of organs, the injury of one or several parts of which, or still more the absence of these parts, necessarily constitutes vocal

alterations, which vary with the kind and place of these lesions; the causes of which must be sought for in the diversity of the organs composing the speaking apparatus. Upon the investigation of these causes depends the treatment of relative aphony, which should always be modified according to their nature, and which it is, for this reason, almost impossible to point out.

HOARSENESS, OR A COLD.

It remains for me to say a few words upon an alteration of the voice, the most frequent of all, which is known by the name of hoarseness, or a cold.

Hoarseness is always the result of a peculiar condition of the mucous membrane covering the vocal cords, or rather of a physical or sympathetic irritation of this membrane, which prevents the parts it lines from contracting properly to produce the sounds; when the irritation is very strong it produces aphony or dysphony.

To distinguish hoarseness from the two vocal alterations last mentioned, it will be sufficient to bear in mind, that in aphony the voice is entirely extinct, while in dysphony the sounds are merely either incompletely articulated or modulated, or

uttered with more or less pain. In hoarseness the voice is veiled, its timbre has lost its purity, it becomes obscure and baser; the emission of sounds is possible, often complete, but harsh, and almost always takes place without difficulty. Finally, for the better understanding of the difference which lies between hoarseness and dysphony, I will add, that the former is found in affections situated upon the mucous membrane of the larynx and bronchi, while the latter takes place, in general, only in affections situated above the glottis, or in the pharynx. Thus there is *hoarseness* in colds, in slight inflammations of the larynx and bronchi; on the contrary, *dysphony* occurs in inflammation of the uvula, tonsils, tongue; in divisions of the veil of the palate, etc.

I will, however, say a few words rapidly upon the causes of hoarseness, although, like the other alterations of the voice, it does not constitute a disease, but rather a symptom of some other affection, principally of a slight inflammation or a sympathetic irritation of the mucous membrane lining the vocal cords, or the trachea, etc.

The causes of hoarseness are, in general, those of a cold or of an acute bronchitis of mild intensity; that is to say, of inflammation of the mucous membrane, in which, as we have just

seen, a change of vitality is produced, either by too great and prolonged cries and vocal efforts, or by some quite other irritation, such as the impression of cold directly upon the vocal organs, or on the external parts of these organs, or any other part of the body; for example, the shoulders, arms, chest, and particularly the feet. To all these causes of hoarseness may be added those we have already pointed out for bronchitis, of which it is a symptom; among these the principal are, the inspiration of irritating powders, those of chlorine, ammonia, etc., etc. When the hoarseness is accompanied by cough with expectoration, it is then the principal symptom of a slight bronchitis commonly called a cold, of which we have already treated when speaking of acute bronchitis.

Hoarseness is also one of the symptoms of several pulmonary diseases, but as affections of this class belong rather to the respiratory than to the vocal organs, we shall not treat of them.

As the treatment of hoarseness depends upon the causes which have produced it, and as moreover this alteration is almost always the symptom of a bronchitis, we must refer for its treatment to that of this affection. (*Vide the treatment of slight bronchitis.*)

CHAPTER XIII.

PECULIAR MODIFICATION OF THE LARYNGO-PHARYNGEAN MUCOUS MEMBRANE.

AFTER a long exertion of the vocal organs, and often too without any of those appreciable causes which we have assigned for the other alterations of the voice, the mucous membrane lining the vocal tube, especially of the isthmus of the throat, undergoes certain modifications, which seem to depend upon a change of vitality or a physiological lesion, the real cause of which cannot be certainly recognised.

This chronic modification, *sui generis*, of the mucous membrane often produces dysphony, and even sometimes aphony, of the kind distinguished by the epithet of relative.

This kind of affection is sometimes characterized by a species of *buccal leucorrhœa*, or mucous discharge from the whole pharyngean cavity. The mucous membrane usually preserves its ordinary color, but it seems to be thickened and covered

with visible follicles and abnormal papillæ, more or less prominent.

Individuals suffering from this discharge, which differs from saliva, and may be compared to the mucous secretions of the nostrils, are constantly endeavoring to swallow, especially when they are about to speak or sing, and their voice soon loses its timbre and is changed into a true dysphonia, similar to that resulting from an enlargement of the tonsils. It is not long since I had an opportunity of observing a case of this kind in a young man. The use of astringent gargles at once gave him a marked amelioration, and the continuance of these measures soon completely triumphed over his dysphonia. The gargle which I prescribed for him was prepared according to the following formula :

Sulphate of Alum,.....	2 drachms.
Red Wine,.....	6 ounces.
Decoction of Peruvian Bark,.....	6 ounces.
Honey of Roses,.....	1 ounce.

This gargle should be employed three times a day.

The condition and physiological modifications of the pharyngeal mucous membrane have, then, a great influence upon the timbre of the voice, but yet this influence is still almost always badly appreciated ; this probably arises from the fact, that

individuals will persist in believing, that the larynx is the only vocal instrument intended exclusively for the formation of the voice. In consequence of this theory, too little attention has been given to the functions of the pharynx and to the part taken by the throat, especially the veil of the palate, in the formation of the acute sounds.

To prove that the condition of the mucous membrane of the superior part of the vocal tube plays, in the timbre of the voice, a part perhaps greater than that of the muscles intended to move it, I will relate what can be observed in the visible vocal organs of a person who is attacked with hoarseness. The mucous membrane is at this time redder than usual ; it also appears more swollen, drier, or more covered with the mucous secretions than in the natural state ; however, if all the parts composing the throat are attentively examined, it will be seen that they are capable as usual of executing all their movements, and that if observed separately or in connection they discharge their ordinary duty, although the voice may be altered in a more or less evident manner ; moreover, is not aphony seen suddenly to arise, from a momentary dryness of the laryngo-pharyngean mucous membrane, or the slightest irritation produced upon this membrane, either by the

swallowing of an ice or a cold drink, or by the inspiration of an atmosphere too cold or too hot? or even by other irritating agents, such as very slight cauterisation of the vocal cords? In all these circumstances, the muscles and all the other parts of the vocal organs being in a state of perfect integrity, the mucous membrane alone is found with certainty modified in its vitality, and consequently upon it alone depend the vocal alteration or complete aphony. A subject so interesting is well worthy of fixing the attention of physiologists, and would require a great number of observations and experiments to supply any thing useful in regard to the treatment of the vocal affections.

Although I have said, at the commencement of this chapter, that it is difficult to appreciate and even precisely to estimate the cause of the modification, *sui generis*, of the laryngo-pharyngean mucous membrane, such as I have pointed it out, I think, nevertheless, that this modification is the result of an irritation and of a latent and chronic inflammation, which has occasioned a vice in secretion or atony; or, in a word, a change in the mode of vitality in the guttural mucous membrane.

CHAPTER XIV.

SORE THROAT, OR ACUTE AND CHRONIC INFLAMMATIONS OF THE PHARYNX.

Aliter acutis morbis medendum, aliter vetustis, aliter increscentibus, aliter subsistentibus, aliter jam ad sanitatem inclinatis.

CELSUS LIB. — DE MEDICINA.

ALTHOUGH our principal object, in this work, has been only to occupy ourselves with the chronic affections which alter the voice, we think nevertheless that it will be useful to say some words upon the acute inflammations of the throat, which are frequently renewed in the chronic state, and are the most common causes of certain lesions, the medico-chirurgical treatment of which we have already exposed.

If all parts of the body are liable to be attacked by inflammation, none are more exposed than the organs forming the throat, and especially the mucous membrane lining it. In fact, constantly under the influence of too cold or too hot an atmosphere, and irritated, too, by the frequent

movements occasioned by the articulation of words and the deglutition of food and saliva, the pharynx, for these reasons, is more liable than any other parts of the body, to inflammations more or less intense. Hence it is not difficult to explain the very great frequency of diseases of the throat, when we consider the changes of the seasons, and all the sudden variations of atmospheric temperature.

All physicians are aware that when an organ is the seat of an inflammation, it swells, becomes painful, and its heat is always more or less augmented. All these characters are manifested in the gutturo-pharyngean inflammations, whether upon one part, or upon all those composing the throat. Thus the tonsils, or all the organs of the pharynx may be inflamed in different degrees, either separately or all at the same time, according to their sensibility and energy, and the frequency of action of the causes which have occasioned the disease.

There are, then, guttural quinsies of different degrees, and pathologists have had reason to divide them into acute quinsies, simple or light, and into intense acute quinsy, called also sore throat, which is likewise terminated by resolution, often by suppuration, and sometimes by gangrene,

which constitutes the gangrenous sore throat which we shall only mention.

The causes of these quinsies are nearly the same with those which we have pointed out for bronchitis, and also for inflammations of the bronchi and larynx. The action of these causes has been more violent in some cases than in others.

The usual causes of guttural quinsy are all those external impressions which act directly upon the region of the neck, whether internally or externally, and which occasion a flow of blood towards the superior parts. Individuals who take the fresh air morning or evening with the head and neck uncovered, whether at an open window or in the free air; those who speak or walk in a direction opposite the wind; those who ride on horseback, especially on the gallop, also facing the wind; lastly, those who, to escape from an excessive heat, suddenly leave the ball-room, the theatre, or any other place at a high temperature, without taking the precautions to cover themselves and wait a short time in an apartment not so warm, are all liable to a more or less severe attack of quinsy.

A sore throat often declares itself as soon as the individual is chilled or has wet his feet, or

because he has resided or only remained some instants in a damp apartment, or one recently washed. All the other causes which we have pointed out already as occasioning most of the vocal alterations, may also sometimes occasion guttural inflammations; they are, the sudden suppression of a blister, a cautery, or an ulcer; a cutaneous eruption healed, or rather driven back by the ill-judged measures of quackery or ignorance; intemperance; the neglect of bleeding or purging, when the custom has been long established; the suppression of an habitual nasal, menstrual, hemorroidal hemorrhage; that of the perspiration, especially on the feet; the fatigue produced by reading, declamation, singing in the high notes, reiterated cries; the use of iced drinks, of irritating articles of food, of pepper, cloves, strong cordials; the contact of some caustic substances; the custom of chewing hard bodies, dried fruits, sugar, filberts, walnuts, almonds; the irritation occasioned by the presence of a foreign body, a fall, a blow, a wound upon the cervical region; lastly, an hereditary disposition: all these may be predisposing or exciting causes of inflammations of the throat.

When the inflammation is seated upon the mucous membrane lining the pharynx, its princi-

pal symptoms are an alteration of the voice, which becomes nasal, especially if the pituitary membrane is also invaded. At the accession deglutition is more or less painful, the inflamed mucous membrane is redder and drier than usual; it appears shining, thick, and swollen, especially the uvula, the summit of which, tickling the base of the tongue, provokes nausea and frequent disposition to swallow.

At a more advanced stage, a secretion of mucosity succeeds to the dryness of the throat; and it is principally when the mucous membrane alone is inflamed, that that which covers the tonsils is covered by a grayish mucus, or sprinkled with white sebaceous concretions.

This inflammation, limited to the guttural mucous membrane, although less severe than the acute inflammations of the tonsils, presents a less painful and more ready deglutition than in this latter case, and a less marked alteration of the voice. It is, in general, of short duration, and almost always terminates in resolution; it may, nevertheless, happen that in some cases it will occasion an abscess in the uvula or in the veil of the palate. When the abscess occupies the latter organ it may be easily recognised by the arrangement of its two halves; that which should

recede is elevated and convex ; the other, on the contrary, is depressed and concave. The uvula, on its part, presents a considerable swelling when it is the seat of an abscess, which may be readily recognised at a more advanced period by the fluctuation perceptible to the finger at its projecting part. These abscesses generally open of themselves ; but I think it is better to open them with a bistoury, used with prudence and precaution.

This species of guttural angina sometimes follows a chronic course, and always occasions dysphony ; it is also characterized by a slight uneasiness in deglutition, by a sensation of dryness and pain of little intensity in the isthmus of the throat ; lastly, by the color of the parts, which are then a little redder than in the normal state.

The inflammation of the throat is most frequently not limited to the mucous membrane, but although simple, and of slight intensity, the irritation is also carried to the tonsils, and declares itself by a greater difficulty in swallowing. The inflammation often extends, and propagates itself into the nasal fossæ, the tube of Eustachius, the larynx, the œsophagus ; also upon the mucous membrane of the mouth and salivary glands. It

appears, therefore, that a simple inflammation of the pharynx may occasion at the same time a coryza, pains in the ears, incomplete deafness, often dysphony for the guttural and nasal sounds, an increase of difficulty in deglutition; lastly, a more abundant secretion of the saliva, and of the mucosities of the mouth.

Notwithstanding their number and the different accidents they occasion, all these symptoms may exist in simple inflammation of the throat, which, in this case, presents no grave character, and may be cured in a few days, when the irritation has not been allowed to reach an extreme degree.

When the inflammation from being moderate becomes more intense, it often invades with violence all the organs we have mentioned, or merely limits itself to some one particular part of them; in these cases, the patients are exposed to danger in proportion to the severity of the inflammation and the importance of the organ. When both tonsils are attacked at the same time, they may acquire a considerable size and impede deglutition, even so as to render it sometimes quite impossible. If the pain is often moderate, at other times it is acute, accompanied with heat and a constant disposition to swallow; and this

action is sometimes so painful as to give rise to contortions of all the muscles of the face.

This melancholy condition of the patients is often rendered still more cruel by their constant desire to spit, and their efforts to reject the mucous secretions, which are thick and viscid. When the swelling of the tonsils is very considerable, the articulation of words is entirely impossible; and the utterance of the vocal sounds and respiration are executed with the greatest difficulty, so that frequently slight suffocations arise.

The disease, carried to this degree, is always accompanied by fever, intense headache, general uneasiness, a thirst that cannot be satisfied; sometimes there is vomiting, and always nausea. If the uvula is attacked, liquids are still more difficult to be swallowed than solids, and the extreme swelling of the veil of the palate, and of the pituitary mucous membrane, renders the inspiration of the air very painful, either because the entrance of the air-passage is diminished, or because the movements of the inspiratory muscles are so painful that they are in some sort condemned to inactivity. When the state of suffocation has reached this degree, it imperi-

ously demands the most prompt succor and the most energetic measures.

If the swelling of the parts does not oppose the sufficient opening of the mouth, the tonsils may be seen forming two tumors of considerable size, often leaving between them only a narrow space; and sometimes these two glands are even seen to touch by their internal faces.

The mucous membrane covering the tonsils always shares the inflammation of these glands; sometimes it is dry and covered with whitish points, sometimes with a mucous secretion, and appears of a bright and deep red. When the inflammation is limited to one tonsil, the swelling which exists only on one side, pushes the uvula to the opposite, to which we see the patients incline when they swallow their saliva or other liquids.

The guttural cough and a laborious expectoration are also ordinary symptoms which are joined to those we have already pointed out; moreover, it is not rare to see the whole pharyngean mucous membrane remain dry during the entire course of the disease; the duration of which is usually from a week to a fortnight, rarely continuing to the twentieth day.

The treatment of guttural inflammations, like

that of all inflammatory affections, consists first in the removal of the causes which have produced them; this is a condition, *sine quâ non*, of a complete and lasting cure; next it varies with the intensity of the disease, the importance of the parts more particularly affected, and especially if the disease be acute or chronic. In other respects, the treatment must be conducted as in all the other affections; and the importance of this medical precept was well known even to the ancients, for, in his first book upon medicine, Celsus said, "*Aliter acutis morbis medendum, aliter vetustis, aliter in crescentibus, aliter subsistentibus, aliter jam ad sanitatem inclinatis.*"

Whatever the nature and kind of the guttural inflammation may be, the patient should be recommended to keep as silent as possible, and to resist the disposition he has to be continually swallowing and spitting. The air he respires should be neither hot nor cold, and his drink and food should contain nothing irritating, either in temperature and consistence, or in their taste and chemical composition. To these measures should be joined rest of the body and mind, an elevated position of the head; in short, every thing which tends to diminish the afflux of blood towards the inflamed parts.

If the disease is slight, and there is no reason to expect that it will become more severe, bleeding may be abstained from, and the physician will limit himself to the employment of irritating baths to the feet, soothing drinks, such as barley-water, pure or with a little milk, infusions of violets or mallows, decoctions of marsh-mallows sweetened with honey, or a soothing syrup, or acidulated according to the taste of the patient ; these drinks should be taken tepid or at the temperature of the room, according as they will be the easiest swallowed.

Notwithstanding the employment of these measures, if the inflammation persists, or seems rather to increase than diminish, there should be no hesitation in combatting it by means of leeches applied to the part of the throat corresponding with the seat of disease ; it is well understood that the number of the leeches applied should always be in proportion to the intensity of the disease and the powers of the patient. In general, it is better to apply too many than too few, and the medium number, in ordinary cases in the adult, is twenty leeches. At the same time, poultices of flax-seed meal may be employed upon the parts affected ; if the odor from them be disagreeable, as it may be especially to females,

their place may be supplied by poultices of ground rice, starch, or the use of a bladder filled with tepid milk. At the same time, laxative drinks and mustard foot-baths may be employed.

When the local pain has disappeared, but there still remains an alteration in the voice and an uneasiness in deglutition, caused by a swelling of the tonsils which is not dissipated, gargles slightly astringent may be employed, like those of the following formula :

Of Infusion of Roses,.....	2 ounces.
Of Barley-water,.....	2 ounces.
Of Honey of Roses,.....	1 ounce.

This gargle may likewise be employed :

Of Buckthorn leaves,.....	1 large pinch.
Of Agrimony,.....	1 large pinch.

Boil them for a quarter of an hour in

Common Water,.....	1 1-2 pounds.
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Strain, and add,

Of Honey of Roses, or Raspberry Syrup,.....	2 ounces.
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It must be borne in mind, however, that these gargles must not be prescribed until the pain has ceased. While it continues, soothing gargles are alone efficacious ; the precaution must also be taken not to agitate them in the throat, as is commonly done, but simply to hold them in the back of the mouth as long as possible without making any of those motions which increase the guttural irritation. The neglect of this precept may be one

reason why this measure, often very beneficial, is sometimes attended with unfortunate results, because the efficacy of the remedy depends, in a great degree, upon the manner of employing it.

If the disease increases in severity, and is accompanied by a very marked febrile accession, blood-letting should be more strenuously insisted on, principally by general bleedings, local emollients upon the neck, rigid diet, complete abstinence from drinks: recourse may also be had to the scarifying cups placed upon the neck; to mustard poultices, blisters, laxative injections of soap and water, honey, mercury; lastly, derivatives and external measures should especially be insisted on. In this case, the employment of emetics, recommended by some physicians, appears to us more injurious than useful, because their principal effect is to provoke strong contractions in the œsophagus and pharynx, and to increase at the same time the afflux and stasis of blood to the superior organs.

When the inflammation is especially directed towards the tonsils, it occasions suppuration in them; but it is rare that the abscess formed in them does not open of itself; the patient then suddenly finds himself relieved, sometimes at the very moment when his cure seemed the most

hopeless. In this case, the mouth should be immediately cleansed by means of a gargle of honey and barley-water; and to hasten the cure, mild laxatives may be prescribed, as veal and herb broths, decoctions of tamarinds, ptisans of prunes, seidlitz waters, injections of honey, etc.; finally, the gargles above mentioned, or, better yet, those composed of barley-water with honey, and slightly acidulated with vinegar or lemon juice, are, in this case, generally useful.

As to the diet, it should vary with the circumstances and the intensity of the guttural inflammation. Those articles of food should be preferred which irritate the least by contact, such as milk, light broths, cooked fruits, creams, jellies of meat or fruits; finally, all mild substances which require but slight motions for mastication or deglutition.

As to the gangrenous angina, we think it best to abstain from speaking of it, both because it is happily rare and is almost always epidemic; and, also, because it would draw us too far from the object of this work; besides, the excellent labors of *M. Bretonneau*, of Tours, upon this subject may be consulted, in which will be found well-made observations, judicious remarks, a very rare medical tact; in short, many proofs of his charac-

ter as a wise and skilful physician. We shall, therefore, content ourselves with remarking, that when an individual finds himself in a district where this disease reigns epidemically, he must, upon the slightest symptom, call in his physician, and in all cases abstain from too energetic measures. Debilitating medicines and bleedings are almost always injurious; while the nature of the disease and experience have established, in some cases, the efficacy of tonics, principally of bark.

If the inflammation of the throat has passed into the chronic stage, it must equally be combatted, at first by antiphlogistics, derivatives, and, finally, by astringent gargles thus made :

Barley-water,.....	8 ounces.
Distilled Rose-water,.....	1 ounce.
Raspberry Syrup,.....	1 ounce.
Sulphate of Alum,.....	1 drachm.

To be employed three times a day till the cure is completed.

If the swelling of the tonsils persist, the cauterisations with a solution of nitrate of silver may be resorted to ; and if this measure does not succeed, and the hypertrophy is not the result of a scrofulous taint, excision of these glands may be practised, especially if the voice be altered, and deglutition impeded.

Before closing this chapter we will add a few words upon an inflammation of the pituitary membrane, vulgarly and improperly called *a cold in the head*.

CORYZA, OR COLD IN THE HEAD.

By this name is called the acute or chronic inflammation of the mucous membrane of the nasal fossæ. If we speak of this affection in this work it is because we rank it among those which most frequently alter the voice. In fact, it then becomes nasal, harsh, and disagreeable, especially in the grave sounds and nasal syllables, the utterance of which requires the issue of the air at the same time from the mouth and nose.

This affection, which is sometimes united with an inflammation of the pharynx, often develops itself without any appreciable cause; but the impression of cold, especially upon the feet and head, although not a specific cause of *cold in the head*, is the most frequent occasional cause. If, almost always it manifests itself alone, it is in many cases united with other catarrhal inflammations and exanthematous affections.

This inflammation of the pituitary membrane at first manifests itself by a feeling of dryness

and swelling, which, with the mucosities and the liquids secreted at a later period, opposes the passage of air through the nose, and renders, for this reason, as we have already said, the vocal sounds harsh, nasal, difficult to utter, and disagreeable to hear. Smell and taste are, in general, very much blunted ; the forehead is often the seat of an acute pain and a manifest feeling of heaviness. The mucous membrane is redder than usual, and frequently this redness and swelling, of which it is the seat, are propagated towards the external parts, rendering the integuments of the nose and cheeks very sensible to pressure. The patients are then subject to frequent and painful sneezings, and to *snuffling*, excited by an inconvenient tickling of the nasal mucous membrane ; and by a continual desire to blow the nose, which requires frequent, but often useless efforts, especially when they endeavor to expel the matters which they think are in the nostrils.

The secretions of the inflamed pituitary membrane vary at different periods ; in some persons they are suppressed from the beginning ; in the greatest number the nasal cavities exhale an abundant hot liquid, possessed of an acrid character, which produces excoriations and small cracks in the wings of the nose and the upper lip.

At a later period, the matter secreted progressively acquires more consistence, and becomes white, yellow, or greenish, according to the intensity of the inflammation; it also takes an insipid and sometimes fetid odor. Finally, it is dried in the form of crusts, and is driven out, either from the nostrils by blowing, or from the mouth, into which they have been drawn by snuffing.

If this affection is sometimes very slight, it is often accompanied by a feeling of general uneasiness, and a febrile action which continues for several days; in general, when the inflammation is intense, it is always followed by sleeplessness, disgust, a feeling of bruises and weariness in the limbs, headaches which render the sick incapacitated for manual and intellectual labors.

The duration of the coryza is usually from four to seven days; its course is often less rapid, and the disease may be prolonged for months, or even for a longer period, in some instances. The secreted matter is then clear and liquid; it is rather a vicious secretion than a true inflammation. There are often, too, a succession of *colds in the head*, arising one upon the other.

The termination of this inflammation always takes place by resolution; we do not consider, as some authors pretend, that it takes place, unless

as an exception, by suppuration, ulceration, gangrene, cancerous thickening, etc. If all these cases have been observed, they have *never* commenced by a true coryza, but have always been the consequence either of an exanthem, a wound, an erosion, or the action of some external cause, which has produced suppuration and the other consecutive phenomena we have indicated.

The treatment of this affection is very simple; it consists in affording protection from the impression of cold, irritating gasses, dust, etc. Patients should be directed, baths of mustard-water to the feet, hot diaphoretic drinks, such as infusions of elder, borage, linden. Where the disease is intense, diet, aromatic fumigations of burnt sugar directed towards the nasal cavities, blisters on the nape of the neck or behind the ears, and in some very rare cases the employment of bleeding are also measures, which arrest the progress of the disease and greatly hasten its termination. When the coryza seems to pass into the chronic state, it will be well at night to cover the forehead and nose with a cravat of muslin; injections may be made into the nostrils of sweetened wine, and pinches of sugar reduced to an impalpable powder may be taken, as if it were snuff, several times a day. These measures, which I have fre-

quently employed, have always given me good results.

I shall close by saying, that individuals who have frequent attacks of coryza should take more precautions, and never lose sight of these words of Celsus : “*Si diutius aliquem et vehementius ista sollicitare consuerunt, huic enim quædam curiosior observatio necessaria est!*” — *Lib. IV.*

CHAPTER XV.

GARGLES.

THE word *gargle*, — *gargarismus* of the Latin, from the Greek *γαργαριζω*, *I wash the mouth*, — signifies a liquid preparation intended to act upon the internal parts of the mouth and throat.

When the mouth is only rinsed and the gargle is employed rather as measure of hygiene and cleanliness than as a medicament, all the muscles of the pharynx as well as those forming the cheeks, particularly the buccinators, should be contracted alternately. By these movements and the simultaneous or alternate contractions of the bucco-pharyngean organs, the liquid may be made to circulate into all the corners and upon all the guttural surfaces. But if the gargle is administered as a therapeutical agent, especially in acute inflammatory affections of the guttural organs, that it may not be rendered more injurious than useful, care must be taken not to contract the organs, as we have already mentioned;

it will be better to retain the gargle as long as possible in the mouth, turning back the head, and avoiding agitation of the liquid ; without this precaution, the contractions and motions which it is customary to make, increase the irritation of the inflamed parts which require repose. It is the neglect of this precept, which has induced some practitioners to assert, that gargles were of more injury than use in inflammations of the throat, and that they increase the pain instead of diminishing it.

If the seat of the disease be confined to the cavity of the mouth, the patient, instead of turning back his head, should keep it level, so as to reject as easily as possible the liquid, and prevent it from penetrating either into the pharynx or air-passages. He should also avoid swallowing the gargle, especially if, as often happens, the substances composing it are of a nature to irritate the digestive organs.

Medical preparations of this kind usually act only locally, and their general effects are always nearly void, although the mucous membrane which lines the mouth and throat is very sensitive, and furnished with very numerous absorbent pores ; the action of gargles is constantly too

sudden to allow the liquids to be absorbed, and carried into the circulation.

Gargles are prepared from many substances; and almost all soluble medicines, or which can be simply suspended in water or any other liquid, have been, or may be, administered in this form. Thus there are emollient, acidulated, astringent, tonic, narcotic, detergent, antisyphilitic, antiscorbutic, and a host of other gargles, according as this or that medicament, having the properties mentioned, enters into their composition.

The diseases in which gargles are employed are the following: inflammations of the mouth and tongue; pharyngeal inflammations, whether acute, simple, or complicated; abscesses of the tonsils; atony; relaxation or paralysis of the organs of the throat; their inflammations; those of the palate and uvula; procidentia of this organ; aphæ; syphilitic, scorbutic, and scrofulous ulcerations; finally, all the affections situated in the bucco-pharyngean cavity. As we have often had occasion to employ different gargles in most of the affections noticed by us, we think it will not be amiss to make them known, as well as the circumstances requiring their use.

SOOTHING GARGLES.

These are usually prepared with the mucilaginous decoctions, roots of the marsh-mallow, flax-seed, pearl-barley, figs, and dates; or of milk, or infusions of the flowers of malvaceous plants. I have often employed with advantage the following:

Decoction of Marsh-mallow Roots,.....	1-2 pound.
" Figs,.....	1-2 pound.
Milk,.....	4 ounces.
Mucilage of Gum Arabic,.....	1 ounce.

This gargle is indicated in acute inflammations of the mouth and throat, in which it diminishes, in concurrence with other antiphlogistics, the heat, pain and irritation.

ACIDULATED GARGLES.

These are generally prepared with a decoction of pearl-barley, or of marsh-mallows, acidulated with acetic or tartaric acid, lemon juice, gooseberries, strawberries, raspberries, etc., sweetened with honey, or some simple or acid syrup; we prefer that of raspberries, because the acid it contains is united to a sort of mucilage. The acidulated gargle, which we usually

employ, is composed according to the following formula :

Decoction of Pearl-barley,.....	1 pound.
Honey of Roses,.....	1 ounce.
Raspberry Syrup,.....	1 ounce.
Lemon juice or Vinegar,.....	2 drachms.

This gargle and others of the species are useful in anginas of slight intensity, not accompanied by fever; they diminish the pain, and promptly appease the inflammation.

TONIC AND ASTRINGENT GARGLES.

They are ordinarily composed with decoctions of agrimony, Peruvian bark, tannin, gall-nuts, cashew, infusion of rose leaves, distilled rose-water, plantain, etc. We have prescribed the following:

Distilled Rose-water,	4 ounces.
Decoction of Agrimony or Peruvian Bark,.....	8 ounces.
Raspberry Syrup or Honey of Roses,.....	1 ounce.

Gargles of this kind are employed with advantage in gangrenous inflammations, and especially towards the end of certain chronic inflammations of the throat, with atony of the tissues.

ASTRINGENT STYPTIC GARGLES.

They are ordinarily prepared with pure water, a decoction of barley or red wine, with the addi-

tion of a mineral salt, which is most frequently the sulphate of alum, of zinc, of iron, etc. Those which have been generally employed by me are the following :

Red Wine,.....	1 pound.
Sugar,.....	1 ounce.
Sulphate of Alum,.....	2 drachms.

The dose of the salt may be progressively increased.

ANOTHER STYPTIC GARGLE, *by M. Bennati.*

Filtrated decoction of Barley,.....	10 ounces.
Sulphate of Alum, from.....	1 to 16 drachms.
Syrup of Poppies,.....	1 ounce.

These styptic gargles have been very often successfully employed by *Dr. Bennati*, and by myself, in the treatment of the aphony and dysphony having for its cause either a particular modification of the bucco-pharyngean vocal organs, or a relaxation, and an atony of the mucous membrane lining these organs. They have, in some sort, in these cases a specific action, *sui generis*, which is incontestible.

ANTI-SYPHILITIC GARGLES.

The basis of these gargles is ordinarily the solution of the mercurial salts, principally of the bi-chloride or nitrate of mercury, sweetened with

the syrup of poppies. I have employed the following :

Distilled Water,.....8 ounces.
Liquor Hydrargyri Oxymuriatis,.....2 ounces.

Sweeten with a sufficient quantity of the syrup of poppies.

Not the slightest fraction of this gargle should ever be swallowed, or serious inconveniences may result.

It is employed with advantage in venereal aphonia and dysphonia, in chancres and slightly painful ulcerations of the same nature, situated upon the veil of the palate, tonsils, etc., and not presenting the characters of active inflammation.

ANTI-SCORBUTIC GARGLES.

They are, in general, composed of tonic decoctions of Peruvian bark, tannin, etc., and more particularly of the fresh juices and tinctures of the cruciferous plants, such as horseradish, cochlearia. This is the formula generally employed by me :

Fresh Juice of Cochlearia,.....4 ounces.
" " of Horseradish,.....4 ounces.
Decoction of Peruvian Bark,.....4 ounces.
Sulphate of Alum,.....1 drachm.

It may be employed with advantage in vocal affections arising from a scorbutic taint.

ANTI-SCROFULOUS GARGLES.

The tinctures and solutions of iodine and its different salts ; in short, all the preparations of this simple body, joined to the tonics and astringents, are the basis of the anti-scorfulous gargles. The following formula has appeared to me of advantage in scrofulous vocal alterations :

Distilled Water,.....	12 ounces.
Pure Iodine,.....	.2 grains.
Iodide of Zinc or Potass,.....	.4 grains.

This may be sweetened with the syrup of orange flowers or violets ; but care must be taken to do it only at the moment when the gargle is to be employed, to avoid chemical decomposition.

IRRITATING GARGLES.

They are, in general, composed of irritating substances, such as the muriate of ammonia, liquid ammonia, in fractional doses and much diluted with water, pyrethrum, etc. ; they are useful in certain partial and incomplete paralyses of the tongue and pharynx.

Gargles may also be made with muriatic and sulphuric acids largely diluted with water ; they have the property of modifying the cancerous inflammations of the mouth and pharynx ; as also

do those made of the nitrate of silver, in the dose of one grain to eight ounces of sweetened water. Gargles of the chloride of soda, in the proportion of one part to four of water, are also employed; these latter gargles have the peculiar property of modifying and even neutralizing the fetid odor which exhales from the mouth, especially in complicated stomatitis, and the different gangrenes of the pharynx and cavity of the mouth.

Before closing this chapter, it will be best to add some remarks upon the caustic substances employed in cauterisation of the vocal organs. These substances are muriatic and sulphuric acids, liquid nitrate of mercury, the nitrate of silver, the solution of this salt, powdered alum; finally, pure creosote.

The muriatic and sulphuric acids are employed pure, by means of a pencil made of a bit of wood, the extremity of which is feathered by cutting the end with a knife. The same method is employed with the liquid nitrate of mercury, often used to cauterise syphilitic ulcerations of the mouth, and which is prepared in the proportion of eight parts of nitric acid to one part of crystalized mercury.

The nitrate of silver is employed either in the

solid form, vulgarly called *infernal stone*, or in the form of a solution applied very carefully by a sponge; this aqueous solution should be made in the proportion of one part of water to one of the nitrate of silver. Finally, pure creosote may be employed as a caustic; a solution of this substance may also be prescribed with advantage, in the form of a gargle in the proportion of one part of creosote to eighty parts of water. The sulphate of alum in powder may be employed by insufflation or immediate application.

CHAPTER XVI.

HYGIENE OF THE VOICE.

AFTER having exhibited the various mechanisms of the production of the vocal sounds, and occupied ourselves with the causes, varieties, and treatment of the principal affections which occasion the alterations of the voice, we are naturally led to add some remarks upon the special hygiene of the speaking organs, and upon the precautions to be taken, either to acquire a beautiful organ, or to preserve it when nature has thus endowed one.

The development of the voice requires, therefore, the most serious attention, and the vocal education should be commenced in infancy, by seeking, with all possible care, to obtain for an organ so admirable and precious, all the modifications of which it is capable.

From the first, the attention should be primarily directed to the development of the articulated voice, in order to impress in season, upon the

flexible and elastic organs of children, the custom of performing those regular motions, which are indispensable to acquire at the same time a sonorous voice, a pure pronunciation, and natural and easy inflexions.

This happy result may almost always be attained by exercising, at an early period, the children, either in speaking, or reading aloud ; but so as never to compel them by too great prolongation of this exercise, or allowing them to take a tone too high or too low. They should, therefore, be forbidden every sort of vocal display or forced cry, and thus prevent their vocal organs, so easily modified at this age, from assuming a harsh or sharp timbre, often too high, and very disagreeable to the ear. They should also be made strictly to pronounce all the syllables, and so govern their voices as to make every period of a phrase perceptible. They should also avoid respiring too often and too suddenly, which may give rise to a sort of hiccough, which not only may have the inconvenience of being ridiculous, but which may often even cause an irritation of the mucous membrane of the vocal cords, and produce an habitual hoarseness, sometimes difficult to overcome.

If the education of the articulated voice should

be commenced at a very early period, it is not the same with the modulated voice or singing; for it is not till they are seven or eight years of age, that the attempt should be made to teach children to sing any gamuts. They will execute these gamuts softly, drawing out the sounds, but they should never extend their exercises beyond an octave in the *medium*, commencing at *re* below the lines for the grave sounds, and finishing at *re* within the scale for the acute sounds. They may, however, be allowed some notes of the faucette, if they take them without making any effort, always gradually, and at periods more or less remote, increasing a semi-tone, or, at the most, a tone at a time; but they should never, in any case, exceed *sol* above the fifth line.

These precepts concern not only the parents of children who have a natural disposition to sing, or who are intended to practise the teaching of music, or such a profession as that of singer, comedian, lawyer, etc. To the latter will be applied the precepts already given; but the others, that is, those who are to be musicians, should be made to study the rules and mechanism of music till they are seven or eight years of age, which is, I repeat it, the period when they may be allowed to commence their singing, always

taking care not to prolong their exercises beyond a quarter, or, at the most, half an hour. By following the course I have traced out, the vocal organs will every day acquire more flexibility and power, and a result will be obtained, which is very rare when this exercise of singing is commenced at a later period.

At the season of puberty, that interesting and critical period of life, when a great revolution is effected in man, and when individuals of both sexes pass from childhood to adolescence, the vocal timbre is completely changed, especially in boys, who commonly lose an octave. That delicious and melancholy moment, in which we first experience the want of love, is not fixed in a precise manner ; but the voice then takes quite another character ; it becomes, on a sudden, more hoarse, grave and harsh. This change is not usually of long duration, and the vocal organs have soon acquired from their new condition more force and extent ; in man, the diapason of the voice usually lowers an octave ; in woman, on the contrary, the change is much less evident, and her vocal timbre, which always preserves more or less the character of infancy, has only gained in vigor and sonorousness.

In general, when it is perceived that the voice

begins to change, professors of music are, for the most part, in the habit of suspending all the exercises, and even forbidding their pupils severely from singing alone. Although, at this critical period, the greatest precautions should be taken that the exercise of singing may not occasion a weakness of the vocal organs, the development of which might thus be arrested, I am not of the opinion of most teachers in this respect, and I think it is better to continue the exercises, even during the period of the transition, always taking the precaution to make them sing with the greatest prudence and reserve, without ever losing sight of this,—that the exercises should never be allowed to exceed a quarter of an hour daily, and should always be limited to an octave and a half, without ever permitting any efforts for the grave, and still less for the acute sounds. Moreover, a general rule to be observed is, to study carefully the voice of the pupils, and to notice every day the notes they have lost, in order not only to cut them out from their exercises, but even not to allow the latter to extend, either in the grave, or acute notes, beyond the last laryngean note but one of those they may have preserved. Finally, there will be a period of short duration when the vocal scale will only

consist of an octave ; at this period alone do I advise the pupil to be allowed to repose, and to suspend all vocal exercises, which may be soon resumed, proceeding gradually from *re* below the lines to *mi*. Notes will afterwards be added as the voice increases in power and extent.

The observance of these precepts, instead of fatiguing the vocal organs and ruining the voice of the pupils, renders more rapid, on the contrary, the physiological revolution of this organ, which, by a moderate exercise, will, at the same time, acquire in its development more suppleness, force and extent. If certain musical compositions, or an ill-directed exercise, have had the power to change the voice, and even taken all their measures from the pupils, it is because during the period of the transition they have not followed the precepts I have just given, and because they did not know how to govern their organs, by taking the precautions required at this critical period.

I will not repeat what I have already said, (page 75,) upon the physical conditions to be presented by those persons, who are intended for the exercise of singing or declamation ; I shall only assert, that it is not enough for them to have a pure and sonorous voice, a delicate ear, a just

intonation ; they should also have a well-formed chest, healthy, ample, contractile and expansible lungs. Those who do not present this conformation, and also individuals of a slender, nervous constitution, or who take cold and cough upon the slightest causes ; lastly, those whose relatives have died of pulmonary phthisis, should all renounce the pursuit of the profession of singer, actor, lawyer, etc. The prolonged and frequent vocal exertions they will be called upon to make, will soon excite in them a disease, which is, unfortunately, but too often beyond the resources of art.

If parents and professors of music, whether in musical academies, or in the city, would more frequently observe the precautions I have given, there would be fewer victims to their voices, and the increasing want of singers distinguished for a flexible and extensive voice would not be daily felt.

When a singer is endowed with a happy conformation, and a vocal organ pure, flexible, and sonorous, all his cares should be directed to preserve it in its purity and suppleness. I will therefore repeat, in a few words, the hygienic rules which will aid him to obtain most easily this result, and I will, at the same time, point

out to him, not only what he should do, but also what he should avoid, to withdraw himself from the dominion of the causes, which occasion the most frequent vocal affections.

From the first, those persons who devote themselves to the practice of singing, should more than any others avoid all impressions of a cold atmosphere, and conform less to the tyrannical power of certain fashions, to which women are more enslaved than our own sex. Notwithstanding the severity of the season, they expose to the action of the cold their bare arms and neck, and they may often be seen to shiver under garments so thin and short, as scarcely to suffice for decency. Thus dressed, these victims of fashion plunge rapidly from an icy atmosphere into a hot air, or repass from this latter, often panting from perspiration, into a temperature of ice: but too fortunate, if they escape with a cold or an alteration in the voice. But death often succeeds such pleasures; or still more to be lamented, we see young persons painfully drag on the remainder of their existence, which seems to be prolonged only to allow them the mournful recollections of the past.

Singers should therefore avoid the unhappy impressions of cold, inasmuch as nothing more

readily induces catarrhal affections of the vocal organs, whether by being brought in contact with their mucous surface by the inspiration of the air or the deglutition of an iced liquid, or if it be primarily directed upon the cutaneous surface.

When, from peculiar circumstances, as happens to all dramatic artists, the individual is compelled to have some part of the body for a longer or shorter time uncovered, there are certain precautions to be taken, which will diminish, in a great degree, the unhappy influence of the cold. Thus, instead of remaining near a hot fire until the moment of appearing on the stage, he should be contented with merely warming himself a few moments, and should endeavor to preserve this artificial heat by walking and making some motions ; care should be taken at the same time to cover a little the parts which are to be exposed to the cold air, in order that they may be less sensible when they are brought in direct contact with it. To render the bronchial mucous membrane also less susceptible, it will be well to keep up some slight excitement of the skin by wearing flannel waistcoats, and avoiding as much as possible cold and damp feet ; for this purpose, flannel hose may be worn covered immediately with hose of gummed taffeta.

The use of hot drinks, of pepper, checkerberry, alcoholic drinks, gargles of the same nature frequently repeated, the inspiration of snuff, of thick smoke, of different gasses, of dust, etc., by irritating the bronchial and laryngo-pharyngean mucous membrane, are injurious to singers, and may at length occasion a hoarseness or even a complete aphony. The use of snuff is equally injurious to the beauty of the vocal sounds, especially in the base notes, for it thickens and irritates the pituitary membrane, and thus, together with coryza, renders the voice harsh and nasal.

Singers should also be careful to use only supple cravats, of a soft tissue; they should not tie them too tight, for by compressing the larynx they impede the voice, especially in the base notes. In tenors and soprani they may cause a sudden attack of apoplexy during the maintenance of a high and prolonged note.

Females should abstain from lacing their corsets too tight, which, by opposing the dilatation of the chest, often compels them to respire out of season, and prevents them from profiting by all their powers and the extent of their voices. The abdominal supporters moderately tight may be

useful to base singers, who are more disposed than others to obesity and abdominal hernia.

Frictions of the skin from time to time with a flannel, or a fine brush, stimulate the cutaneous surface, and combat more or less the tendency of certain singers to catarrhal affections. It will also be useful (I speak to singers by profession) not to sing for some hours after eating, because when the stomach is distended by food, the size of this organ prevents the depression of the diaphragm ; wherefore, the respiratory functions are not so well executed.

Of all excesses, that which is the most injurious to singers is, without doubt, that of the pleasures of love ; I might instance several cases of individuals who have completely lost their voices in consequence of excesses of this kind. M*****, an old, distinguished singer of the Italian Theatre, was attacked with complete aphonia after a night of debauch. Those who would preserve for a long time a beautiful organ and a pure and sonorous voice, should practise the utmost reserve in the pleasures of Venus. It is the same with that shameful vice of onanism, which make so many victims in both sexes, and which is perhaps as often the cause of the hoarseness of the voice at the period of puberty as puberty itself. The

very great sympathy between the *sexual* and vocal organs easily explains why the least excitement of the former reacts promptly upon the larynx, and immediately makes its pernicious influence felt upon the timbre of the voice.

Singers should also abstain from singing in the open air, especially in the evening, when the temperature is cold and moist; the neglect of this hygienic precept will be attended with yet more serious consequences, if the singing, or even speaking, is performed with the face turned towards the wind. When obliged to go out during a damp and low temperature of the atmosphere, the singer will take the precaution always to carry his handkerchief before his mouth and nose; in this way he will always respire a temperate air, and be withdrawn from the irritating action of the cold. *Martin*, our celebrated singer, whose admirable voice is still so pure, so flexible, and so extensive, never fails to take this precaution.

Females, at the period of their menses, will do well to wear drawers of flannel, as they are then more impressible; they will thus avoid painful menstruation and suppressions, which always affect the voice and often the health. It will be even prudent for them not to sing at these periods,

especially the great airs of our modern operas ; their vocal timbre being then always less pure, and the emission of the voice less easy, they may become more readily fatigued than at any other period, and at the same time expose themselves to a poor appreciation of their talents and powers. Females who are encientes should for the same reasons sing less frequently and for a shorter time ; during the duration of their pregnancy they are more liable to hoarseness, dysphony and aphony.

However useful the moderate exercise of singing may be, by the movements which it impresses upon the pulmonary system and all the muscles of the chest and abdomen, in the same proportion is its excess injurious. What is said with regard to the modulated voice applies equally well to the articulated ; the rules are nearly the same for singers, actors, lawyers, clergymen, etc., and in general for those who speak often and with ardor, and for a long time. All, especially at the age of adolescence, when the pulmonary system is developed, are liable to the spitting of blood, aneurismal dilatations of the heart and large vessels, and to acute and chronic diseases of the chest and vocal organs, properly so called. These accidents are occasioned, generally, by the long

expirations they make, and the too rare or sudden deep inspirations, to which they are subjected. The great art of singers and of orators is to know when to respire, and never to attempt, by efforts and display of the voice, to exceed the extent of their means and vocal power.

If I were not apprehensive of being drawn into too lengthy considerations, I might add a host of hygienic precepts in relation to those who exert their voices much, whether in singing, or in declamation. Without entering, in this respect, into lengthy details, which are rendered less necessary by the advice already given, I will add, that those who devote themselves to exercises of the voice, should always do it with moderation, especially at the earlier periods, and they cannot, without great danger, attempt to change the kind of voice which nature has imparted to them. They should lead a sober life, using all things and abusing nothing. Finally, they, even more than all other men, should never lose sight of these precepts of *Hippocrates*, which, in some sort, comprise all the rules of hygiene,—*Modera-
rata durant, atque vitam et sanitatem durabilem
præstant;*” and that general law of the old man of Cos, included in these eight words,—“*La-
bor, cibus, potus, somnus, venus, omnia sunt
mediocria.*”

Notwithstanding all the precautions we have recommended, as soon as persons who devote themselves to exercises of the voice perceive a spitting of blood, however slight, with a dry cough; as soon as they find themselves growing thin, they should abstain from singing, under penalty of an early death from pulmonary or laryngeal phthisis. To avoid hemoptysis and sanguineous congestions of the superior parts of the body, the employment of moderate bleedings, and the use of foot-baths cannot but prove advantageous; so, also, to remedy the other accidents, and to dissipate the fatigue, which is often the result of singing, it will be well to follow the counsels of Galen, who directed the frequent use of warm baths, with the view of sustaining the clearness, purity, and force of the voice.

To terminate our remarks upon the hygiene of the voice we will add, that if the exercise of this organ, carried beyond certain limits, may prove injurious to the health, the exercise of singing, when it is moderate, can calm our agitated minds, reanimate our exhausted powers, arouse our courage; finally, become a sort of instinctive relief, to enable us to support our troubles and hardships. The sailor upon the sea, the traveller on his weary way, the captive in his prison, the

laborer, the artisan, the shepherd, and the soldier, all sing, as it were mechanically, to suspend or dissipate their fear, their sadness and fatigue.

We shall be but too happy if the counsels we have thus rapidly given prove useful to some. In giving them, we were of opinion, that the physician who seeks to preserve the health of his fellow-citizens is, at least, as useful as he who cures their diseases. It is for us to say with *Seneca*, that it is a greater service to support one who is upon the point of falling, than to raise him up after he has fallen: “*Pluris est labantem sustinere, quam lapsum erigere.*”